

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Gautier Steel Company, Limited, Johnstown, Penn.

The present depressed condition of the iron interest—a depression the extent of which is shown by constant and almost daily reports of stoppages, assignments and failures of our rolling mills, and which is

fires in which it is used. Bituminous coal is a necessity for rolling mill work, and although for some purposes anthracite may be substituted, yet to a certain extent all Eastern mills must be supplied with a softer and hotter fuel than hard coal, and that cannot be found east of the Alleghenies. The new rolling mill of this company,

From the gradual growth of the iron business in this country, few rolling mills have an interior arrangement at all adapted to convenience in working, as the mills have in most cases increased to many times the size contemplated when they were built, the additions being made as necessity dictated. The consequence has been a conglomeration

passes through the rolls that bring it to the shears, which are placed by the side of another track, so that as the steel is cut it may be banded and loaded directly on the cars. A like arrangement is seen in the wire mill, by which coal and rods may be unloaded directly where wanted and the wire put on the cars where finished. A

double their capacity. As this had been previously contemplated, however, it could be carried out without impairing the efficiency of the arrangement. They make all grades and sizes of wire, and when finished this winter their mill will cover over two acres, a large part of which will consist of two stories. The galvanizing room will be 50 by

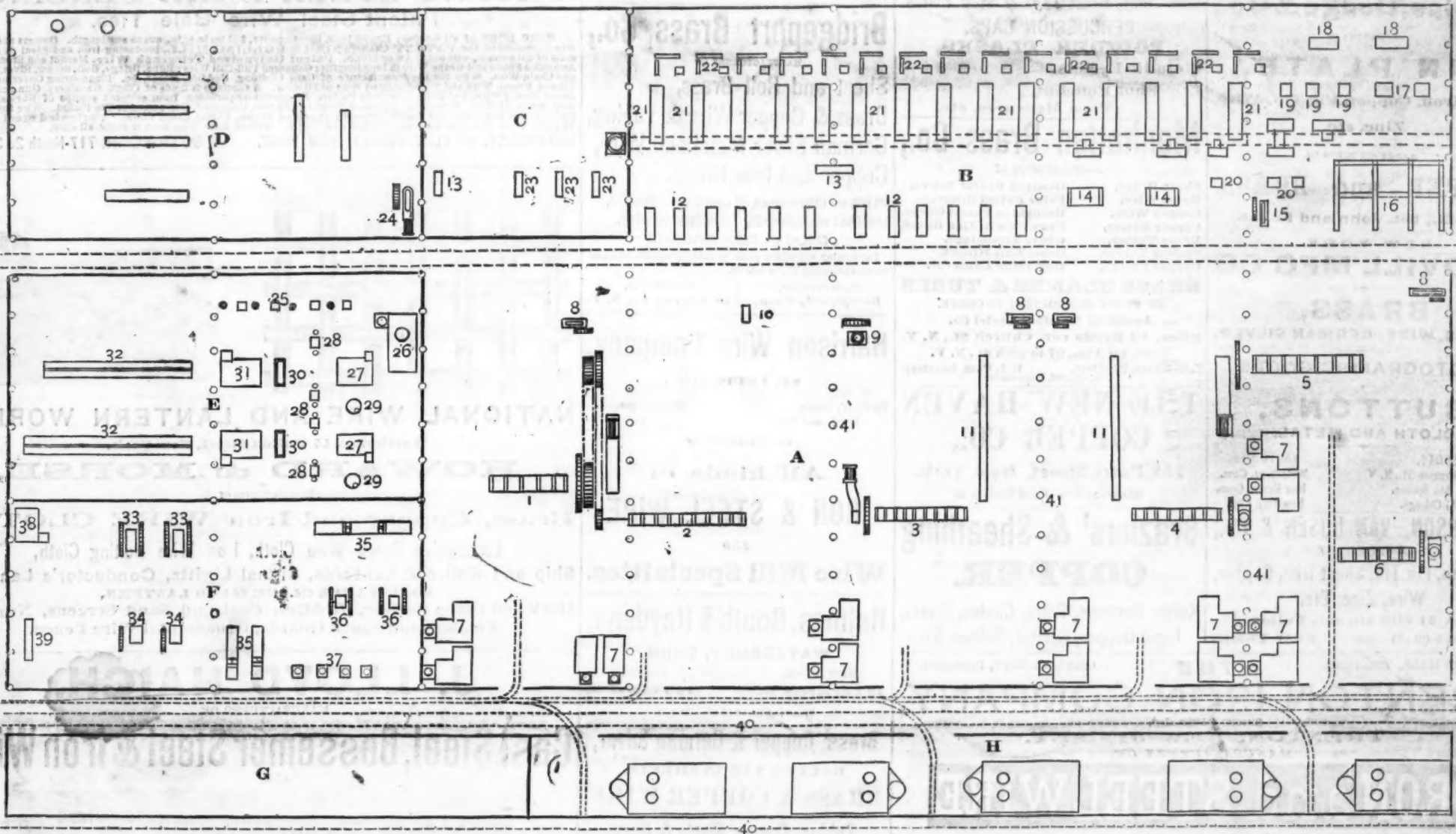


Fig. 1.—PLAN OF GAUTIER ROLLING MILL.

PLAN OF ROLLING MILL—Fig. 1.
A.—Rolling Mill.
B.—Spring Shop.
C.—Stock Room for Springs.
D.—Rake Shop.
E.—Finger Bar Shop.
F.—Carpenter Shop and Shipping House.
G.—Bar Mill.
H.—Rod Mill.

3.—Guide Mill.
4.—Spring Mill.
5.—Sheet Mill.
6.—Slitting and Handround Mill.
7.—Heating Furnaces.
8.—Cold Shears.
9.—Engine for Cold Shears.
10.—Wire Rod Reel.
11.—Straightening Plates.
12.—Grindstones.

13.—Testing Machines.
14.—Taper Rolls.
15.—Cold Shears.
16.—Stock Racks.
17.—Punches.
18.—Trimmers.
19.—Slotting.
20.—Eyebolt and Heading Machines.
21.—Fitting Furnaces.
22.—Fitting Tables.

23.—Finishing Machines.
24.—Engine for Spring Rake and Bar Shop.
25.—Pointing Machines.
26.—Boiler.
27.—Retort Furnaces.
28.—Drop Forges.
29.—Forming Tables.
30.—Hardening Tanks.
31.—Tempering Furnace.

32.—Testing Tables.
33.—Presses.
34.—Shears.
35.—Planers.
36.—Finger Bar Shears and Punches.
37.—Straightening Hammers.
38.—Tempering Furnaces.
39.—Testing Machines.
40.—Railroads.

probably even more deeply felt in Europe—has necessitated that every possible benefit consequent on abundant credit and careful management, should be utilized to the utmost.

The struggle for existence in the present fierce competition seems to require in addition that every possible advantage of location that could result in reduced freight rates to leading markets, and in cheapness of fuel, ore and supplies, and a plant arranged in the most approved way, with the best equipment for the work, should be possessed by the successful houses of the future. Their competitors, working at a constant disadvantage, are either compelled to sell at a continual loss or else permit the quality of the goods to deteriorate, which naturally leads to a not less disastrous result.

We have been led to these remarks by a consideration of the action of D. G. Gautier & Co., formerly of Jersey City, who, recognizing the fact that for the immediate future business must be conducted with a smaller profit than formerly, have moved their steel plant from its former situation, and selected a location which seems to them to offer facilities equal, if not in some respects superior, to that occupied by any rival house.

That one of the largest and most successful iron works of the country is in Johnstown, Pennsylvania, their new situation, may have served to some extent to convince them that no better point could have been chosen. Aside from this, however, a careful investigation of the advantages this town offers, must lead to a favorable conclusion as to its fitness. It is on the main line of the Pennsylvania Railroad, within easy distance of the large sea-coast cities; at the same time not widely separated from the markets of the West and South, and close to the river navigation of the Ohio, the great feeder of the Mississippi.

It is in a valley which was once largely filled by coal, which by the slowly working forces of nature has been washed away, leaving, however, in all the surrounding hills horizontal strata of coal, into the excavations in which railroad tracks penetrate, and from which locomotives bring the coal from the spot where mined directly to the

comprising also the spring shop and machinery for making hoes, rakes, teeth, and finishing finger bars, covers between two and three acres, being 455 feet long and 200 feet wide. It has seven trusses, each of 65 feet span, the girders and supports being entirely of iron and stone, together with which all possible precautions against fire have been

of trains of rolls and machinery, resulting in much extra expense and inconvenience. This result has seemed necessary for the reason above mentioned, but occasionally circumstances arise by which a mill can be erected on plans fully decided on in advance, and in which every portion of the mill is seen to be intended as a part of a compact whole.

large portion of the work of this concern is steel for agricultural implements, plow steel, steel for mowers and reapers, cultivators, barrows, grain drills, &c., together with the manufacture of horse rake teeth, of which they made last year sufficient for 35,000 rakes, or half of all used in the United States and Canada, and steel finger or cutter

180 feet, the demand for that kind of wire for fencing and other purposes having largely increased within the past year. In addition to the rods that can be supplied by their own mill, they use all that can be rolled by the wire rod mill of the Cambria Iron Company, which is probably the most perfect ever constructed, it being able to successfully roll as small sizes as No. 7, 8 and even 9 gauge, and has a capacity of over 50 tons per day.

Few but those whose attention has been called to the matter realize the number of uses to which wire is put, from the tiny pin to the thousands of miles of ocean cable. As illustrations of the amount used may be instanced the massive suspension bridges, the lengths of telegraph wire and the wire used for binding grain. For this last purpose there will be used this year 1,000,000 miles of wire, all of which, before another season, will be cut up and disappear. It might also be almost literally said that the entire West is being fenced in with either plain or barbed wire. For the latter purpose the wire must be flexible, yet tough and strong, and should be in as long lengths as possible to avoid splicing. Their entire capacity will be over 50 tons of steel, 65 tons of wire and 200 pairs of carriage springs daily, and their future progress will be watched with interest by all engaged in similar lines.

Hajor Henry Howell, of Sarnia, Canada, is claimed to have invented a new process of refining petroleum without the agency of heat. A sample manufactured from American petroleum at 45 gravity is stated to be a very brilliant and white oil of 48 gravity and 122 fire test. The yield from the crude was 93 per cent. But the most extraordinary claim for this process is not merely that the means used are entirely mechanical, but also that there is no production of gasoline or benzine, and the entire product is standard white illuminating oil, far superior to the oil refined under old methods. This new process, if what is claimed for it be true, is just precisely what the producers have been looking for; but the probabilities are that the claims will not bear scientific investigation.

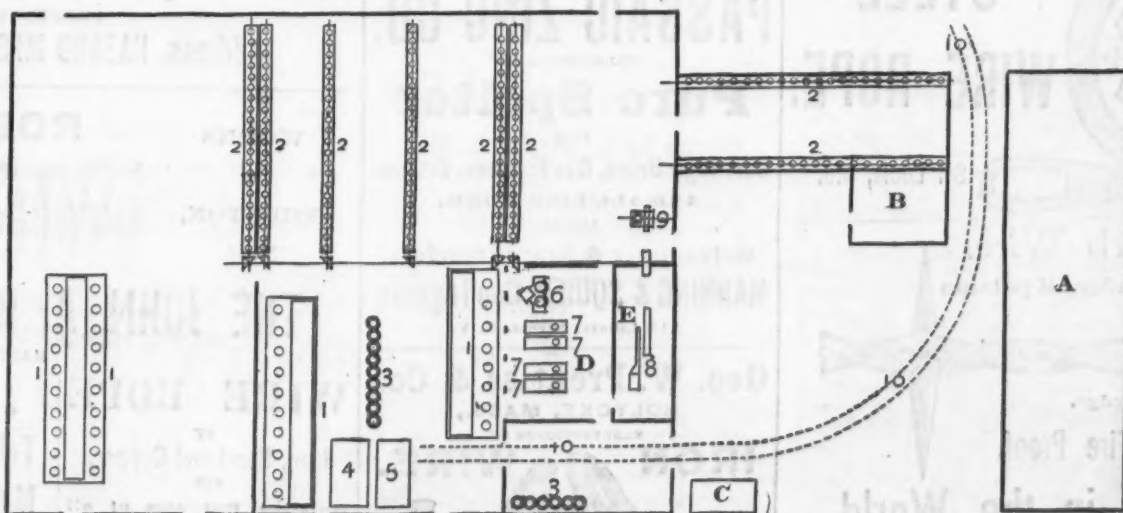


Fig. 2.—PLAN OF GAUTIER WIRE WORKS.

WIRE WORKS—Fig. 2.
A.—Galvanizing and Tinning Shop.
B.—Machine Shop.
C.—Office.
D.—Boiler House.
E.—Engine House.

1.—Annealing Furnaces.
2.—Wire Drawing Benches.
3.—Cleaning Tanks.
4.—Wire Heating Furnace.
5.—Muffle Furnace.

6.—Vertical Corliss Boiler.
7.—Horizontal Tubular Boiler.
8.—3 inch x 60 inch Corliss Engine.
9.—18 inch x 30 inch Vertical Engine.
10.—Railroad.

taken. The rolling mill has 4 nine inch, 2 twelve and 2 twenty inch trains of rolls, run by independent engines, one round rolling machine, two heavy steam hammers, with boilers and fires in keeping, together with all the improvements that experience could suggest, either to increase the amount of the product or improve the quality or finish.

We present herewith a ground plan of the rolling mill and wire mill of the Gautier Company, in which it will be seen that the utmost convenience has been studied, and that almost no labor in removing stock from one part of the mill to another is needed. Cars may be switched from the Pennsylvania Railroad and unloaded directly beside the heating or melting fires. From there the steel

bars for mowers and reapers, of which they are the only manufacturers in America. They also manufacture tire spring and toe-calk steel, carriage and wagon springs. They have 14 fitting fires and 9 grindstones. Their wire mill was completed a few months ago, but the demand for wire assumed such proportions as to compel them to make additions, now nearly completed, that more than

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SEE PAGE 9.**Phelps Dodge & Co.,**

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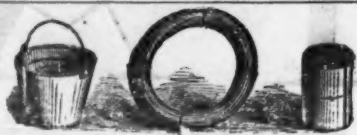
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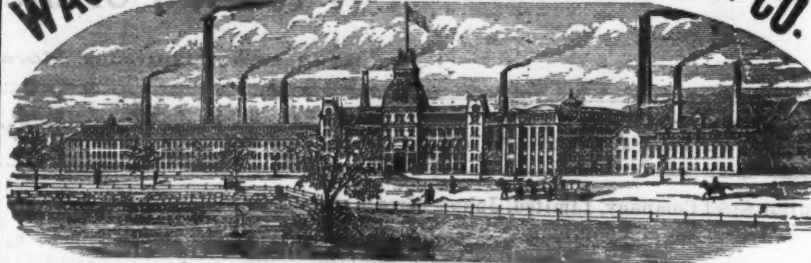
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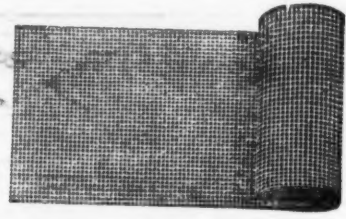
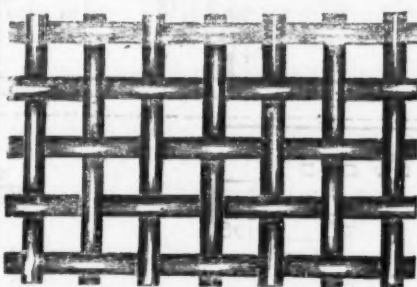
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HEAVY AND LIGHT FORGINGS
Of all kinds
FOR CARS, LOCOMOTIVES AND ENGINES,
Including Drawbars, Axles (either hammered or
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Shafts, Cranks, Propeller Frames, Oil Tool Forgings
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WORKS at Denham Station, Pa.
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U. S. CHARCOAL TERNE PLATES,
Stamping Iron, Show Card Iron,
Tappers, Bessemer Steel Plates and
Shovel Iron.
Stove Pipe Iron cut to size.
Special sizes of Pickled and Cold Rolled Iron
made to order.
Send for specification and price list.

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LABORATORY.**
Exclusively for the
Analysis of Ores of Iron, Pig and Manu-
factured Iron, Steels, Limestone, Clays,
Slags and Coal for Practical
Metallurgical Purposes.
No. 339 Walnut St., Philadelphia.
J. BLODGET BRITTON.

This laboratory was established in 1866, at the in-
stance of a number of practical Iron Masters, ex-
pressly to afford prompt and reliable information
upon the chemical composition of the substances
above mentioned, for smelting and refining pur-
poses. The object being to make it at once a con-
venient, practically useful, and comparatively inex-
pensive adjunct to the Furnace, Forge and Rolling
Mill.

CHARGES TO IRON WORKS.
For determining the per cent. of Pure Iron in
an ordinary Ore..... \$4.00
For the per cent. of Pure Iron, Sulphur and
Phosphorus in do..... 12.50
For each additional constituent of usual oc-
currence..... 1.50
For those of unusual occurrence or difficult
to determine, the charge must necessarily
depend upon circumstances
For determining the per cent. of Sulphur or
Phosphorus in Iron or Steel..... 7.00
For each additional constituent of usual oc-
currence..... 1.00
For the per cent. of Carbonate of Lime, and
insoluble Silicious Matter in a Limestone..... 5.00
or each additional constituent..... 2.00
or the per cent. of Water, Volatile Combust-
ible Matter, fixed Carbon, and Ash in Coal..... 12.50
For determining the constituents of a Clay, Slag,
Coke, or of an Ash in Coal the charges will corre-
spond with those for the constituents of an ore.
For a written opinion or letter of instruction the
charge must necessarily depend upon circum-
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Printed instructions for obtaining proper average
samples for analysis furnished upon application.

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Manufacturers of every description of
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its kind in use.
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laying work, it is especially
adapted for ladies' use.
Price \$20. Liberal discount to
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eter. Let us take, say, sample "E." Experi-
ment No. 7, and see the relation that exists
between the stress measured by the original
area and by the decreasing area that such
stress produces, which is the really correct
measure.

Experiment No. 6.

Stress per sq. in. on iron as per original dia.	Stress per sq. in. on iron as per reduced dia. at each stress.	Successive in- creases at per cent. original dia.	Successive in- creases at per cent. reduced dia.	The reading of original diam. less by
25,724	25,724
28,174	28,174	2,450	2,450
30,624	30,624	2,450	2,450	177
33,074	33,074	2,450	2,450	296
35,524	35,524	2,450	2,450	414
37,974	37,974	2,450	2,450	1,039
40,424	40,424	2,450	2,450	1,496
42,874	42,874	2,450	2,450	2,145
45,324	45,324	2,450	2,450	2,976
47,774	47,774	2,450	2,450	4,073
50,224	50,224	2,450	2,450	6,270
52,674	52,674	2,450	2,450	22,793

The last calculation on the reduced diam-
eter was not made on the diameter after
fracture. It was made on the diameter at
moment of fracture. (See Experiment No.
7, "F.")
It will be seen that while the stress per
square inch varies in the first case by a con-
stant quantity of 2450 lbs. per square inch
up to the last addition of constant stress, in
the second case the amount of variation for
each constant addition varies from 2567 lbs.
to 4648 lbs. per square inch, while for the
further addition of 2203 lbs. necessary for
the fracture of the sample, the stress on the
reduced area varied 18,690 lbs.

The influence of the calculation of the
stress upon the original instead of on the
reduced area, will thus naturally prevent the
true action of that stress from being noted;
and the further from the limit of elasticity
such stress the less is the calculation spoken
of a measure of what occurs. We can see
now more plainly why the effect of inter-
mittent stress on very soft irons can be ob-
served by referring the stress developing
same to the original instead of to the re-
duced diameter.

Considering our failure to note increased
strength with repeated breakings in the light
of these facts, we must remember that the
calculation was made on the original areas
of the iron, not on the reduced areas pro-
duced in each by the previous fracture.
The three parts of No. 2 (A and B) broken
consecutively would have given each time a
higher strain, calculating the stress on the
reduced area produced therein by the break-
ing of the previous part.

Or again, we can understand that if, in-
stead of subjecting the samples to test with
the three turned sections, one only had been
turned to size first, and after the fracture
of this one a fresh portion had been turned
down, the second stress would have probably
been higher per square inch.

What were the exact methods of testing
of the authorities quoted would have to be
known before the bare statement generally
given of this fact could be applied, either
pro or con. To the deductions our various ex-
periments have led us to. If our deductions
are correct, we can understand the exist-
ence of two classes of irons:

1. That class in which increase of density
gives an increased limit of elasticity and
ultimate strength, which is the case with
fibrous irons of commerce as ordinarily man-
ufactured.

2. That class in which increase of elastic-
ity and ultimate strength are obtained with-
out increased or even with decreased den-
sity, which is the case when the above irons
are treated for that purpose artificially, after
being manufactured by the ordinary process.

There would exist this difference: That
calculations based on decreased areas at
given stresses would, for the same ultimate
strength and limit of elasticity, give a greater
resilience or amount of work done in the
fracture of the former than of the latter.
We have seen that this would not
necessarily apply were the reduction in area
not taken into consideration. That it should
be considered seems to me evident. In other
words increased strength without increase
of density can only be obtained by decrease
of ductility. Increased strength without de-
crease of ductility can only be obtained by
increase of density.

LOUISVILLE, Ky., Nov., 1878.

**The Great Iron Pier, Pavilions and
Breakwater at Long Branch.**

Mr. John Fitch, president of the Long
Branch Ocean Pier Company, with much
enthusiasm described to a reporter of *The
Iron Age* the grand system of sea-side im-
provements now rapidly in progress at Long
Branch, which it is expected will be in
readiness for a rush of business next season
far surpassing anything yet witnessed at
Coney Island. "There can be no com-
parison," said Mr. Fitch, who is sometimes
better known as the Register in Bankruptcy.
He explained that an enormous business is
already done at Long Branch, much of it in
connection with the hotels, the Lelands and
the West End Hotel alone each consuming
500,000 tons of ice during the season.
Then the fish trade of that region is on a
large scale, and is capable of being
vastly extended, besides the watermelon
and peach trade. But the passenger busi-
ness is the reliance, for excursion boats will
ply between Long Branch, New York and
other points, transporting thousands who
will be drawn by the attractions now in
preparation.

The great iron pier for the accommoda-
tion of steamers and freight boats will be
run out seaward 660 feet. The location is
directly in front of the principal hotels, "for
you see," said Mr. Fitch, "this enterprise is
assumed by a number of New York gentle-
men, friends of the Lelands, who will make
a single dash, expending \$500,000 more or
less, as may be found expedient, with the
expectation of rapid returns for the invest-
ment. If we succeed competitors will come
up like mushrooms, and our success must be
realized within a few brief seasons if at
all." Accordingly the buildings will be in
their nature temporary, though elegant and

commodious. Those on the pier, comprising
pavilions for music, promenades, also for
purposes of trade, will be put together with
"hooks," so that they can be removed in
winter. Immense quantities of wrought
iron will be used in the various construc-
tions, and the contractor, Mr. Job Johnson,
of Brooklyn, N. Y., has a large force en-
gaged on the work. The iron works are
busy, both in Brooklyn and Pennsylvania,
and considerable purchases of machinery
are making.

The pier will be formed of wrought iron
tubular piles, numbering about 150, strongly
clamped together, driven down and pro-
tected at the bottom from eddies by bell-
shaped collars slipped over them, each nearly
5 feet in diameter and resting on the sand.
A fine observatory, with its saloon and spa-
cious balcony, will adorn the pier head.
Further down the pier is the music pavilion,
combined with a café and music stand, and
at no great distance are the fishing pavilions
and great dining balcony, 700 feet in length
and proportionately wide, from which a
staircase will lead down on either side to
1000 bathing rooms beneath.

The breakwater, occupying a space be-
tween the sea wall and pier head, will be
250 feet in length by 28 broad, likewise
formed of wrought-iron piles, numbering 39,
and arranged in sets of 13, and placed di-
agonally, so as to form a material support.
All will be connected by iron girders, with
capscrews on. The deck of the pier will be
25 feet above low water. At its end there
will be machinery run by a powerful engine,
one design of which is to still the waves arti-
ficially by means of a huge swinging boom.
The breakwater pier, for the ice trade, &c.,
will be finished about July 1, and other parts at
still earlier date. Among passenger arrange-
ments contemplated is a "round trip" over
the Elevated Railway and by the Long Branch
boats, which will leave each terminus every
five minutes. The whole scheme as detailed
is quite magnificent, and the parties en-
gaged, though prepared for possible failure,
anticipate golden harvests.

Steel Headed Rails.

As in many other points of metallurgical
practice, opinions differ widely on the merit
of steel headed rails. It may prove of in-
terest to cite the utterances of a number of
experienced metallurgists on this subject, as
expressed during a discussion following the
reading of a paper on the result of an ex-
periment with Wheeler's process of combin-
ing iron and steel in the head of a rail, read
by W. E. Cox, the well-known manager of
the Philadelphia and Reading Co.'s Rolling
Mill, before the American Institute of Min-
ing Engineers at its Chattanooga meeting.

Mr. Slade, of the New Jersey Steel & Iron
Co., said that the steel-headed rails made
by the Trenton Works were exclusively
puddled steel-headed, it having been found
that with this steel a reliable weld to the
iron could be obtained, the point in which
all attempts to make steel-headed rails from
Bessemer steel had hitherto failed. As to
the life of solid steel rails, he could give
from memory no accurate data, but might
mention that steel rails, probably of about
60 pounds per yard, laid on the main line of
the Pennsylvania Railroad, in Trenton, in
1868, were taken up in February, 1877, after
a service of say eight and one-half years. As
to the puddled steel-headed rails referred to,
the results obtained on the Erie, Phila-
delphia, Wilmington and Baltimore roads
had shown that their capacity was equal
to a traffic of 350,000,000 to 400,000,000 tons
at one mile per hour, or say 35,000,000 to
40,000,000 tons, at 10 miles per hour, an
amount from twice to two and a half times
that borne by good iron rails.

Mr. Cox, on the contrary, stated that
they had made numerous experiments with
puddled steel-headed rails, which had never
given satisfactory results; the difficulty
was not in the welding to the iron, for the
union was perfect, and they heated and
rolled easily, but from want of density and
hardness of the steel in the finished rail;
they soon gave out by spreading of the steel
under our heavy traffic, showing that the
steel was too soft. It did not break, or
sliver, or peel, but mashed out like lead.

Prof. Eggleston claimed that the general ex-
perience with steel-headed rails has been,
that while some of them were good, many
of them separated, after a time, at the
point of junction, from imperfect welding,
and that taking the bad and the good to-
gether, it was less profitable to use the steel-
headed than steel or even iron rails. The
sample of rail shown (produced by the
Wheeler process) certainly did not give
promise that the rails would last very long
in the track. Some of the steel-headed
rails which were made in New York State
some years ago, had a wedge-shaped projec-
tion on the head which descended two or
three centimeters into the web of the rail.
The compression caused by the traffic forced
the wedge down and opened out the web, so
that the head was sometimes loose for a
considerable distance.

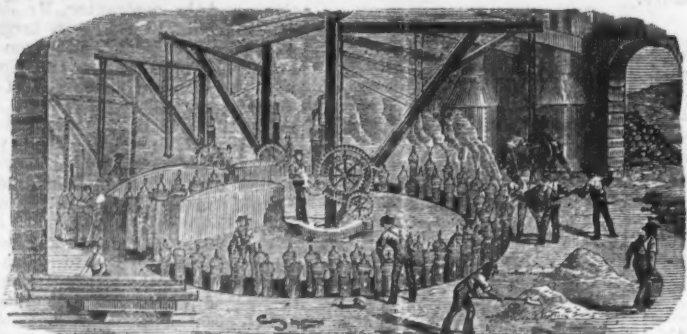
Mr. Cox then added that at the Philadel-
phia and Reading Rolling Mill they made
some steel-headed rails in 1869 and 1870,
with steel from the open-hearth furnace,
cast into ingots and then hammered into
slabs 9 inches wide by 2 inches thick; these
slabs were used for the heads of the rails,
and welded on to iron piles at our mill. Most
of these rails are still in their tracks, doing
as good service as solid steel rails, and the
only reason their manufacture was dis-
continued was their inability to make them
any cheaper than a rail entirely of steel.
They have tried also the Booth steel-capped
rails, made by clamping, when cold, a
grooved head-bar of steel on to an iron steam
and base; these gave good results, and
would have done better had the steel been
thicker; but this was also more costly than
the solid Bessemer steel rail.

A silver mine which promises to be valua-
ble has been discovered in the same series
of speers of the Allegheny Mountains
through which the great copper lead runs,
which extends from Pennsylvania through
Virginia, North Carolina, Tennessee and
Georgia. The vein, judging from specimens
tested by analysis, promises to yield a fine
compensation to the owners.

McNEALS & ARCHER,

BURLINGTON, N. J.

Flange Pipes.



General Foundry Work.

CAST IRON PIPES

FOR WATER AND GAS.

THE EDGAR THOMSON STEEL CO., LIMITED.

MANUFACTURERS OF



General Office and Works at Bessemer Station (Penn. R. R.), Allegheny County, Pa.
New York Office, 57 Broadway.

The members of the Edgar Thomson Steel Company, Limited, have had large experience in manufacturing and in railway management; their works are the most complete in the world, with all the late improvements, and are located in the best Bessemer metal district in the United States, and their managing officers are experienced in the manufacture of Bessemer Steel.

The Company warrants its rails equal in quality to any manufactured in the United States. Rate of any weight or section furnished on short notice. Orders for trial lots solicited.

Branch Office and P. O. Address, No. 48 Fifth Ave., Pittsburgh, Pa.
D. McCANDLESS, Chairman. WM. P. SHINN, General Manager.

MIDVALE STEEL WORKS,

CRUCIBLE AND OPEN HEARTH STEEL.

TIRES AND AXLES

OF EVERY DESCRIPTION.



TOOL, MACHINERY AND SPRING STEEL CASTINGS AND FORGINGS.

WORKS AND OFFICE: Nicetown, Philadelphia, Pa. WAREHOUSE: 12 N. 5th St., Philadelphia, Pa.

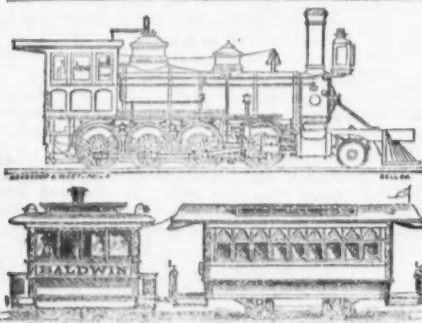
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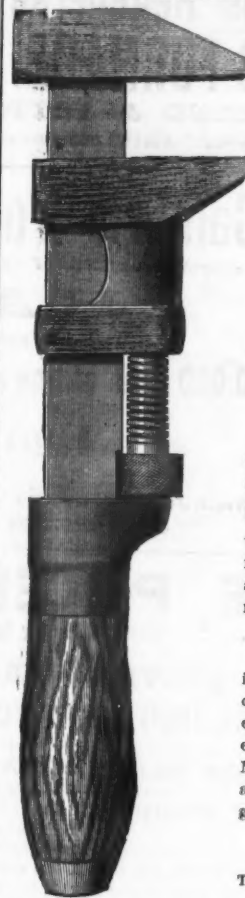
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for Tanners, Paper Mills, Fire Purposes, suitable for
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(Pat. July 9th, 1878.)

In addition to the great variety of Iron and Brass
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years, we are now making a full line of **COPPER
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sprout and cone are drawn in one SEAMLESS piece.
No brazing or soldering is required. Being made of
as heavy stock, they are stronger and more durable,
give a perfect valve seat, and require no repairs than
those made in the old manner. The Barrels are tested
with a five hundred pound inside pressure to the
square inch. The Sprout also is seamless. Dealers
and Plumbers pronounce them far superior to any
before in the market. The inside of the Pump and
the working parts are thoroughly tinned, giving a
healthy surface for the contact with water. The
handle is convenient and nickel plated. The Pumps
are highly finished, neatly painted and decorated
with gold bronze, the whole being a highly service-
able and ornamental article for a kitchen of the most
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No charge for Boxings. Freight paid to Boston or New
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Warren & Co., and Bogman & Vinal; in Prov-
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WORLD'S EXPOSITION, Paris, France,
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THE GOLD MEDAL,
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TUTE AWARDED THE "HOWE" THE **GOLD MEDAL.**
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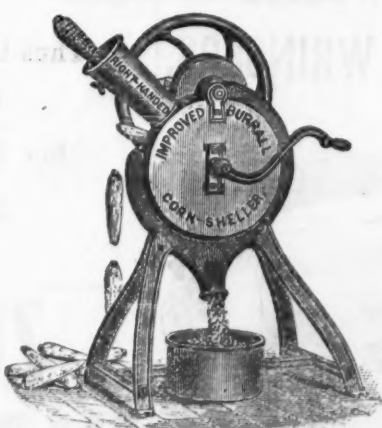
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It is best and cheapest.
It is a right-handed Sheller.
It is all iron and very durable.

It shells and separates perfectly clean.
It will shell either large or small corn.
It has no outside gears and will not clog.

We manufacture the only genuine **Burrall Corn Sheller**, having been making them for the
past 15 years. It is therefore of very great importance that you should purchase shellers with our
name on to avoid trouble in getting repairs. We can pack from six to eight in a hogshead. For prices
or other information, address

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ARE MADE BY

THE D. R. BARTON TOOL CO.,

Cor. Mill and Furnace Streets, ROCHESTER, N. Y.

AGENCIES:

HEATON & DENCKLA, 507 Commerce Street, Philadelphia, Pa.
H. O. STRATTON, 33 Oliver Street, Boston, Mass.
HUNTINGTON, HOPKINS & CO., Sacramento, Cal.
NATHAN WEED, 4 Gold Street, New York.

American Interests in Sheffield.

Mr. Webster, U. S. Consul at Sheffield,
England, writes to the State Department as
follows:

The number of articles of American
manufacture and the quantities of agricul-
tural produce already imported into this
consular district are very large. A degree
of prejudice existed at first. It was said
that American implements would do well for a
time, but they would not last. That this state-
ment was wide of the truth is proved by the
testimony of large importers, who are doing
an increasing business. Still there may be
danger of allowing the quality of articles
made to sell abroad to depreciate, as com-
pared with the same that are designed for
the home market. Sharp and intelligent
critics are watching our productions, and
the great importance of keeping up the
quality of American articles for export to
the highest standard cannot be too strongly
urged. The English people have been ac-
customed to articles of a heavy make, but
our lighter wares, if really good, will win
their way to general favor.

There was a prejudice at first against
American hay forks. They were distrusted
as wanting in strength. But now that they
have been proved they are very much liked.
One firm here has sold over 2500 dozen of
them this season, and is having calls for
more than they are able to supply. Ameri-
can scythes and snathes are coming into use,
and a large trade in them is looked for next
year. The firm above named is doing a
good business in a great variety of Ameri-
can goods. The following are some of the
articles and quantities sold, viz.: 2145 dozen
locks, 14,676 iron planes, 1185 dozen box-
wood rules, 2952 dozen hat and coat hooks,
220 dozen hammers, 372 dozen weighing
machines, 2520 screw wrenches, 230 dozen
saws, 600 dozen drawer pulls, 1680 dozen
auger bits, 753 axes, 4000 braces, 2800 fret-
work saws, 20 tons oil stones, 2400 dozen
axle pulleys, 32 dozen scythes, 250 dozen
snathes, rakes, glass cutters, &c., &c.
Other firms are engaged in the same line of
business, the aggregate of whose sales would
be several times the above amounts. One
dealer has imported goods to the amount of
£7000, consisting among other things of
locks, spokes and rims, hubs, brackets,
augers and bits, bench screws, tailors'
shears, sash fasteners, hammer and ax
handles, planes, spokeshaves, wrenches, hay
forks, axle and frame pulleys. American
manufacturers must, however, expect sharp
competition. Already some of the articles
above named are imitated here, at a cheaper
rate probably than they can be made in the
United States, and are sold as American.

The amount of fresh meat sold in Sheffield
during the last six months is 182,370 pounds.
The aggregate sold in this consular district
would undoubtedly reach 500,000 pounds.
It has given very general satisfaction. The
prejudice against it has almost entirely dis-
appeared, and arrangements are now mak-
ing to largely extend the sale, by a company
who are to open twelve new shops. The
prejudice was at first fostered by the
butchers, and it is said that at the begin-
ning of the trade very poor qualities of
English beef were sold as American, for the
purpose of discrediting the genuine article.
Now the American is sold indiscriminately
with the English. One house sells the
American flag flying as its sign. This mar-
ket is also abundantly supplied with Ameri-
can canned meats, lobsters, salmon, oysters,
turtle and fruits, as well as cheese, bacon,
hams, lard, butter, tongues, flour, corn flour,
hominy, &c. Indian corn and meal is sold
largely, but it is not yet sufficiently well
known to be considered fit for human food.
If the methods of cooking it, so well under-
stood at home, could be introduced here, the
demand for the best quality would be greatly
increased. Printed instructions for cooking
it in various ways, and scattered among the
people, would be of use.

American lard, refined in Belfast and put
up in bladders, seems to be much preferred
here to the American refined article, and is
bought by large dealers here, even at the in-
creased cost of carriage from Belfast. Can-
not our refiners change this?

Pickled mackerel, so welcome at our home
breakfast table, is never, or very rarely,
seen here. Can it not be added to the al-
ready long list of our food exports? The
same may be said of smoked halibut.

American carriages would be admirably
adapted to the fine roads of this country.
They are not seen in this part of England.
It would seem that a large business could be
done in American doors, sashes and moldings,
and in all kinds of turned articles of wood,
especially of black walnut; also in all the
varieties of builders' ironmongery. The last
trade has already begun, but may be greatly
extended.

Our Commercial Relations with
Venezuela.

The following is from Mr. J. E. Eckert,
United States Consul at La Guayra, Vene-
zuela, to the Department of State:

I am at work on a commercial report, but
not knowing when I will be able to complete
it, I deem it important that the exporters
and manufacturers of the United States
should know in what relations they stand
with merchants and consumers in Vene-
zuela. I am sorry to be compelled to speak
so plainly in this my first dispatch, but at
the same time am fully aware that the sooner
the true state of affairs is made known the
more will be the advantage to our exports.
If the desire and wants of Venezuela are
strictly adhered to there is every indication
of a good and thriving trade with the United
States; if not they most assuredly will con-
tinue in the trade with Germany, England
and France; and why? Simply because
they know when the goods are shipped they
will be according to order. I have talked
with many, and it is the universal cry: "I
would like in many cases to buy the articles
of the United States, but goods are
packed so poorly, and so little attention is
paid to requirements as set forth in orders,
that it is impossible to do business with any
degree of certainty, and as a matter of fact

we who have to pay a large duty on the
gross weight and can only make a percent-
age on goods in a good condition, have too
much risk to run; while on the other hand,
Germans, English and French are only too
glad to comply to the letter in filling our or-
ders, however unnecessary the precaution
may seem to them. It is true, Ameri-
cans in the manufacture of almost all
goods we use are equal, and in many
cases superior, at the same prices, to
what we get from the Continent, and in ad-
dition orders could be filled in an infinitely
shorter time, as distance is so much less,
and, too, another great item, freight would
diminish in the same ratio; but with all this
we prefer dealing with those who are in-
clined to follow our instructions."

From one or two merchants with whom I
have talked I learn that the class of com-
mercial travelers usually arriving in Vene-
zuela is not calculated to inspire confidence
with a people who are willing to trade, but
from past experiences are losers instead of
gainers. It is the duty of the commercial
traveler to first ascertain the standing of
the firm with whom he intends doing busi-
ness, to the entire satisfaction of his firm,
and then to take their orders and faithfully
and promptly fill them according to contract,
and not, as was the case with one of the
largest and most reliable houses here, take
the order, and, after keeping the house wait-
ing for some months, refuse to send the
goods. Once a foreign merchant has had
this experience it will be a long time, if
ever, he regains the confidence required
to renew business with a country at
whose hands he has received such treat-
ment, unless possibly through some commis-
sion merchant whom he might know. It is
also complained of that American merchants
send out agents on commission instead of
salary. In doing this, in many cases, the
agent allows a discount of 7½ per cent in-
stead of 15 per cent, which is greatly
against the American market, for it deprives
the merchant of 50 per cent. of his discount.
And also one other very important point—
exporters on the Continent allow a six
months' credit (the time actually allowed
here in the retail trade), while thus far the
Americans only allow ninety days. As a mat-
ter of course, in a country where the credit
system is so universally the custom as here,
this gives the advantage to the merchant to
buy and pay with advantage. I will not
speak of the possible good or injury attend-
ing a people who buy on credit to such an
extent, but I speak simply that you may be
aware of one of the great barriers which
exists with trade between the United States
and Venezuela.

To substantiate what I say, let me cite a
few cases which I have taken from mer-
chants, who, in answer to my question—
Why do not the United States do a larger
business with Venezuela? said: "The
Americans seem to imagine that packing,
as directed by us in our orders, is not at all
necessary. I ordered a piece of furniture,
and instead of complying with my order
they packed in a box, on which I had to pay
duty of over \$100. Duty here is on the
gross weight (box and contents), while if
they complied the duty would have been
probably \$20. I ordered and sent draft for
a piano advertised, as I understood, for \$95,
and, after waiting four months, was in-
formed the price was \$100." The merchant
said, especially in his case, there was no ex-
cuse, as they knew perfectly well his stand-
ing, to say nothing of the dilatory manner of
treating him. On account of some trouble
has been done away with, and in its
stead lamps are universally used. A lamp
manufacturing company sent out lamps as
sample, but neglected to send the kind of oil
used in them. A letter was written asking
for sample of oil, but for some unaccount-
able reason the letter was never answered,
and where there was every appearance of a
large order or contract nothing was done.

I might cite many such cases, not from
one but many of the leading wholesale and
retail merchants; but you will not fail to
see the condition by the three already noted.
Hence you see the greatest of all draw-
backs with American goods is the lax and
bad manner of packing almost all classes of
goods, and in some cases inattention, and
these being probably the easiest and yet
most important parts. I fail to see the rea-
son why they should be entirely neglected,
for in so doing, as I have endeavored to
impress in this dispatch, the manufacturers
shut themselves out of the possibility of
future orders, while on the other hand, by
slow and sure degrees, carefully attending to
the wishes and desires of Venezuela) they
could supplant the goods of the Continent for
American goods. I think it is a subject
upon which our manufacturers and export-
ers should think, and not without considera-
ble study, for upon their final action depends
the future success of American exports in
Venezuela.

Flint Bricks.—Under the title of "Im-
provements in furnaces and other building
blocks, retorts, crucibles, and other fire-
resisting articles," a patent has recently been
taken by Mr. E. Selwey, of Bridgend, Glos-
tershire, for bricks composed of pure
flint, without the admixture of alumina or
any other substance to detract from the
high refractory character of the material.
The inventor treats the flints in such a man-
ner as to produce from them, when in a pul-
verized condition, bricks or blocks of great
structural strength and durability, superior
in fire-resisting properties, it is said, to the
best descriptions of fire-clay goods. His
patent also extends to the manufacture of
artificial stone for building purposes. The
material when burned resembles a fine-
grained freestone, and is sufficiently hard to
resist the action of the weather. It is in
furnace work and similar applications, how-
ever, that these bricks are expected to be
most successful.

The Cleveland Viaduct.—The long con-
templated viaduct which connects the two
sections of Cleveland over the Cuyahoga
river was opened Dec. 27th with great
ceremonies. Governor Bishop, the military,
the societies and an immense number of
guests participated. After a triumphal pro-
cession there was a banquet and a ball. The
viaduct is over half a mile long, and is built
of masonry and iron. It cost \$2,150,244.



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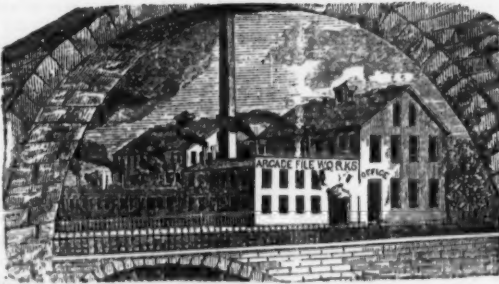


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NEW AMERICAN FILE CO., Pawtucket, R. I.

AUBURN FILE WORKS,
Superior Hand-Cut
FILES AND RASPS,
MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.
FULLER BROS., Sole Agents,
89 Chambers and 71 Reade Streets, N. Y.

ESTABLISHED 1848.



C. T. DRAPER & CO.
Sing Sing, N. Y.
Manufacturers of SUPERIOR
HAND CUT
FILES AND RASPS

MADE FROM BEST
ENGLISH CAST STEEL.
Quality guaranteed by written warranty
when required.

Steam and Frost prevented on Show Windows.



REVOLVING VENTILATORS

For everything (and every size), from a hat or cap to an exhibition building.

Kitchens, Laundries, &c., ventilated without draft. Durable, strong, without rivets or solder. Oiled for six months. Each one has storm cap. Retail price, size six inch diameter, \$1.00 and upwards; apparatus with which any one can cut circles in glass, 15 cents each.

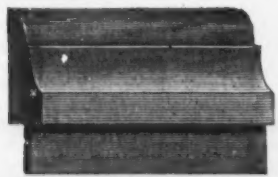
Protective Ventilators avoid drafts, exclude dust, dampness, malaria and germs of disease; adopted by hospitals, schools, institutions, &c.; applied to any window or room.

Prof. A. L. Loomis, M. D., University of City of New York, writes as follows:
"From my personal experience and that of my patients who have used your Ventilator during the past six months, I am convinced that your method of removing dust, impurities and dampness from the atmosphere is the best which has as yet been proposed. By it the air in an apartment can be constantly changed without causing drafts. I would especially recommend its adoption in sick rooms, sleeping apartments, nurseries and school rooms."

Air Filters and Moisteners, placed over hot-air registers of furnaces, &c., prevent dust and supply steam filtered air. Prices and discounts to the trade sent on application.

The "Economy" Molding Weather Strip is perfect in every respect. By enlarging edge of rubber or felt, and making slot in molding to correspond (see engraving), we save all after expense of molding. Once purchased it will last a lifetime, because rubber, etc., has only to be removed by taking old piece out of either end of molding, and sliding in a new piece. By this method of securing rubber all uncertainty of fastening or undoing of glue or tacks is overcome.
Rubber supplied with enlarged edge and instructions to enable Car Manufacturers, Carpenters, Builders and far off trade to make slots in Sashes, Doors, Moldings, &c., and thus make perfect Weather Strips.

No. 6.



BRACHER VENTILATOR CO., No. 3 Park Row, New York.

"Common Sense"

MOUSE TRAPS,

For Home and Export Trade.

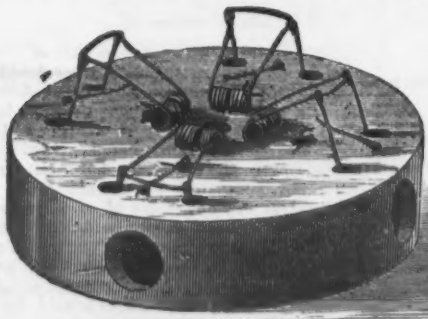
BEST IN MARKET.

RIPLEY MFG. CO.

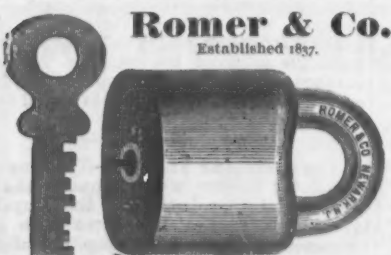
Unionville, Ct., U. S. A.,

Manufacturers of

House Furnishing Hardware.



Romer & Co.
Established 1837.



**MACHINE MOULDED
MILL GEARING.**

AS ACCURATE AS CUT GEARING.

AND MORE DURABLE IN USE.

Saves Time and Expensive Patterns.

SHAFTING, PULLEYS AND HANGERS.

A SPECIALTY,

LEFFEL TURBINE WATER WHEELS,

STEAM ENGINES AND BOILERS,

MIXERS FOR FERTILIZERS AND CHEMICALS.

POOLE & HUNT, Baltimore.

FILES & RASPS,

Best Cast Steel.

HAND-OUT. Manufactured by

JOHNSON & BRO.

No. 1 Commercial Street, Newark, N. J.

ESTABLISHED 1860.

Chas. Spruce & Co.,

Manufacturers of HAND CUT

FILES AND RASPS.

Every File warranted.

CHALMERS & MURRAY,

Sole Agents, 76 Reade St., New York.

ESTABLISHED 1860.

SPENCER & UNDERHILL,

84 Chambers St., N. Y., Agents for

American Screw Co.'s Wood, Machine and

Rail Screws, Stove and Tire Bolts, Rivets, &c.

O. Ames & Sons, Shovels, Spades and Scoops.

A. Field & Son, Tacks, Brads, Nails, &c.

G. F. Warner & Co., Carriage Clamps.

We have also on hand a general assortment of Hardware

when required.

ESTABLISHED 1860.

THE GIANT PAD LOCK.

Manufactured by

THE SMITH & EGGE MFG. CO.

(Centennial Award.)

"Superior in Every Respect."

This is one of the best selling Locks in the market,

and affords the dealer a large profit. It is thoroughly

and strongly made—of the best material—very hand-

some in appearance, and every Lock is warranted.

Orders solicited. Address as above.

Lock Box 105, Bridgeport, Conn.

ESTABLISHED 1860.

Keystone

CLOTHES WRINGERS.

ESTABLISHED 1860.

Wood Frame Cog-Wheel Wringers.

No. Size of Rolls. Price per doz.

10 10X1 1/2 \$60.00

12 10X1 1/2 63.00

14 11X1 1/2 68.00

16 11X1 1/2 71.00

Wood Frame Friction Wringers.

No. Size of Rolls. Price per doz.

1 10X1 1/2 \$31.00

2 10X1 1/2 34.00

3 11X1 1/2 39.00

Self-Adjusting Iron Frame Friction Wringers.

No. Size of Rolls. Price per doz.

2 1/2 10X1 1/2 51.00

3 10X1 1/2 54.00

4 11X1 1/2 59.00

EVERY WRINGER WARRANTED.

Special rates given for export.

Send for price list of other goods for home and

export trade.

F. F. ADAMS & CO.,

Erie, Pa.

ESTABLISHED 1860.

Black Diamond File Works.

ESTABLISHED 1860.

Awarded by Jurors of Centennial Exposition, 1876, for

"VERY SUPERIOR GOODS."

G. & H. BARNETT,

39, 41 & 43 Richmond St., Philadelphia.

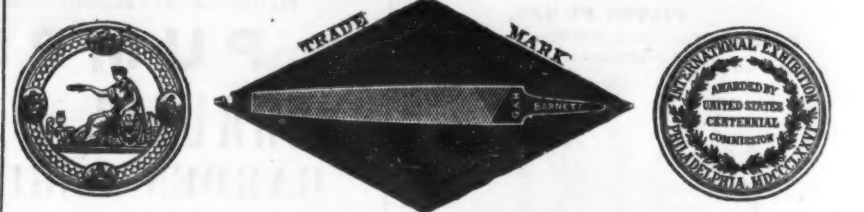
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ESTABLISHED 1860.

Black Diamond File Works.



Awarded by Jurors of Centennial Exposition, 1876, for

"VERY SUPERIOR GOODS."

G. & H. BARNETT,

39, 41 & 43 Richmond St., Philadelphia.

CHARLES B. PAUL,

Manufacturer of HAND CUT FILES.

Warranted CAST STEEL. 187 Tenth Street, Williamsburgh, New York.

All descriptions of Files made to order. Price List mailed on application. Established 1863.

HELLER & BROS.,

MANUFACTURERS OF CELEBRATED

AMERICAN HORSE RASPS AND FILES,

NEWARK, N. J.

ESTABLISHED 1860.

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A. FIELD & SONS

TAUNTON, MASS.,

MANUFACTURERS OF

AMERICAN AND FRENCH

WIRE NAILS,

TACKS, SHOE NAILS,

And Every Variety of Small Nails.

Offices & Factories at Taunton, Mass.

Warehouse at 78 Chambers St., New York,

where may be found a full assortment of Tacks, Brads, Wire Nails, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above-named goods made from sample to order.

A SILVER MEDAL has been awarded above goods at the Paris Exposition, being the only medal awarded any American manufacturer of Tacks and Wire Nails.

Hoisting Machinery

MANUFACTURED BY

CRANE BROTHERS MFG. CO.,
Chicago.

The Upright Family Scale

PATENTED.



With Tin Dish.
Weighing 12 lbs.
by 1/4 lb.

List \$16 per
Dozen.

Liberal Discount
to the Trade.

This Scale has an
attachment for
Taking the
Tare. Just the
thing for family use.

Manufactured by

JOHN CHATILLON & SONS,
89, 91 and 93 Cliff St., NEW YORK.

Geo. M. Eddy & Co.,
351 & 353 Classen Ave., Brooklyn, N. Y.
Manufacturers of

MEASURING TAPES.

Of Cotton Linen and Steel.
For all purposes for which Tape Measures are required.
Only manufacturers of

Paine's Patent U. S. Standard Steel
Measuring Tapes,

Pat. Spring Measuring Tapes
of 12 and 25 ft. lengths.
FINE TEMPERED STEEL SPRINGS.
FINE TEMPERED STEEL BAND SAWS.
From 1/4 inch wide upward. Warranted tougher than
any other Band Saw. Catalogues on application

PRIZE MEDALLISTS:

London, 1862; Oporto, 1865; Dublin, 1865; Paris,
1867; Moscow, 1873; Vienna, 1873; and only
Award and Medal for Self-Coiling Steel
Shutters at Centennial Exhibition,
Philadelphia, 1876.

CLARK & CO.,

ORIGINAL INVENTORS AND SOLE

PATENTEES OF

Noiseless Self-Coiling Revolving STEEL SHUTTERS,

FIRE AND BURGLAR PROOF.

Also Improved

Rolling Wood Shutters

Of various kinds. Clark's Shutters are the Best
and Cheapest in the world. Are fitted to new
Treboux Building, Lenox Library, Delaware and Hud-
son Canal Co.'s Building, Transatlantic Steamship
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County Court House, Mt. Vernon, Holt County
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Cincinnati, Detroit, Janesville, Wis., Baltimore,
Canada, &c. Have been for years in daily use in
every principal city throughout Europe, and are in-
dorsed by the Leading Architects of the
World.

Office and Manufactory,

162 & 164 West 27th Street, N. Y.

ANSONIA CORRUGATED STOVE PLATFORM

Manufactured by the

Ansonia Brass & Copper Co.

Office, 10 & 21 Cliff Street,
NEW YORK.



Patented
Oct. 24, 1878.

Out Showing Round Platform.

Section Showing Edge.

ANSONIA Bronzed Fire Screen,

With Ornamented Mouldings.

PATENT APPLIED FOR.

The Portable Bronzed Fire Screen or
Shield, as shown in the illustration, is especially
designed for the safety and protection of walls, fur-
niture, woodwork, paper or varnish from heat.
Being constructed of metal, with firm and substan-
tial edges, curved in form to stand alone, it may be
easily adjusted to any position about a stove, before
a grate or fire place. The demand for something
useful, durable and ornamental as a Fire Screen has
long been felt, and having finally accomplished the
desired result, we are prepared to fill all orders
promptly.



BROWN & SHARPE MFG. CO

Providence, R. I.,

MANUFACTURERS OF

MACHINERY & TOOLS.

Gears Cut and Index Plates Made and
Drilled to Order.



PATENT CUTTERS FOR THE TEETH OF GEAR WHEELS

can be sharpened by grinding without changing their
form. Cutters made on this plan will outlast many of
the old form, with the advantage of being always ready
for use. If the cutter becomes dull before a wheel is completed, it can be taken out, sharpened and
returned to its place in a few moments without risk of altering the form of teeth to be cut. Cutters
for milling any irregular form made to order on the same plan. Parties having occasion to use mills
for irregular shapes on sewing-machine, gun or other work, will readily see the advantage such cutters
possess over those in general use, both as regards economy and convenience. Descriptive circular
with price list sent by mail on application.

GRAHAM & HAINES,

P. O. Box 1040.

113 Chambers and 95 Reade Streets, New York.

HARDWARE MANUFACTURERS' AGENTS, as follows:

Lawrence Curry Comb Co.,
Curry Combs.
Hosard Bros. & Co.,
Cotton, Wool and Curry Cards.
Thompson, Derby & Co.,
Scythe Snaths.
Otago Fork Mills,
Steel Forks, Rakes, Hoes, &c.
H. Knickerbocker,
Scythes, Axes and Tools.
H. W. Kipp, Nail Hammer.
Kloman, Park & Co., Vices,
Picks, Mattocks, Grub Hoes, &c.
Jacobus & Nimick Mfg. Co.,
Locks, &c.
Sawdust Tool Co.,
Planes and Plane Irons,
Geo. M. Eddy & Co.,
Measuring Tapes.

Wheeling Hinge Co.,
Hinges and Wrought Butts.
Northwestern Horse Nail Co.,
Horse Nails.
A. G. Coes & Co.,
Coes' Genuine Screw Wrenches.
F. K. Silby, Emery Cloth.
Holroyd & Co., Stocks & Dies.
Sedgwick Mfg. Co.,
Butter and Flour Triers, etc.
Ripley Mfg. Co., Mouse Traps.
Plymouth Tack & Rivet Works.
Carr, Crawley & Devlin,
Miscellaneous Hardware & Cast
Bells.
J. Mallinson,
Cast Steel Shears and Scissors.
Ketchum's Pat. Metallic Sieves.

W. D. Turner & Co.,
Geneva Hand Fluters.
D. B. Niles & Son,
Hand and Sleigh Bells.
C. B. Osborne & Co., Com-
passes, Calipers, Dividers, &c.
C. W. Maguire, Brushes.
Clark Bros. & Co.,
Carriage Bolts, &c.
Loverre & Tucker, the Genu-
ine Knox Fluting Machine.
T. B. Barclay,
"Dodge's" Kentucky Cow Bells.
Lane Bros., Swift's and Gro-
cers' Coffee Mills and Measuring
Faucets, &c.
T. C. Richards Hardware Co.,
Bright Wire Goods, Picture Nails,
&c.

RHODE ISLAND HORSE SHOE CO.,

OFFICE, 81 Canal Street, Providence, R. I.

WORKS at Valley Falls, R. I.

Manufacturers of

PERKINS and RHODE ISLAND PATTERNS of

HORSE AND MULE SHOES.

The Electric Light.

The rapid progress which the science of
electric lighting has made within a short
time, and its immense importance to the
world, has attracted very great public inter-
est in this country and in the old world.
There has been much misunderstanding on
the subject, and a very general feeling ex-
ists that the production of light by electric-
ity is an entirely new invention. To correct
the misapprehensions on this subject and
give our readers a general idea not only of
what has been done in the past, but what is
now going on, we have prepared a series of
articles upon the history and present state
of electric lighting. In addition we shall
take up the machinery, &c., now in use and
give descriptions and illustrations.

For years there has been all over the civ-
ilized world a progressively increasing agi-
tation on the subject of illumination by elec-
tricity. This agitation, hitherto confined to
scientific and industrial circles, has within
the past few months reached a climax, and
has profoundly aroused the interest of the
public in general. Long-established inter-
ests, until now unaffected by advances in
electric illumination, are suddenly regarded
with a suspicion of their stability and future
enjoyment of an undisputed monopoly in
consequence of a rumor that Edison has
practically overcome the last barrier oppos-
ing a general introduction of electric illu-
mination—the divisibility of the electric light.
This rumor has been given shape by the for-
mation of a company and by the repeated
professions of Mr. Edison that he has actu-
ally succeeded. While the panic to which
it gave rise, and which was more pro-

ferent branches of the same current, it is
necessary to furnish each branch with a
regulator so contrived that an increase of
current corresponding to too near an ap-
proach of the carbon points will produce
automatically an increased resistance in that
branch circuit, whereas an accidental in-
crease in the distance between the carbon
points of any lamp will cause the regulator
to reduce the extraneous resistance of the
circuit to a minimum."

While thus the divisibility of electric light
and its application to domestic illumination
is a matter still in its infancy, yet possibly
on the eve of a successful solution, there are
other applications of the electric light which
have already earned a well-established prac-
tical application, the importance of which
cannot be overestimated. We refer to the
lighting of industrial establishments, ware-
houses, harbors, public squares and light-
houses, which at the present period of de-
velopment more directly interest manufac-
turers.

The history of electric illumination is
associated with some of the most famous
names of modern science. In 1811 Sir
Humphrey Davy made his discovery of the
voltaic arc between carbon points, produced
by voltaic batteries, but the cost of electric
lighting by the aid of voltaic or magnetic
batteries would be enormous, and it was
only when dynamo-electric machines were
introduced and perfected, by which power
could be converted into electricity, that it
became of any practical value whatever.
Faraday in 1831 added the second funda-
mental discovery, that of the induction
of electricity by magnetism, which laid the
basis for electro-magnetic machines. He

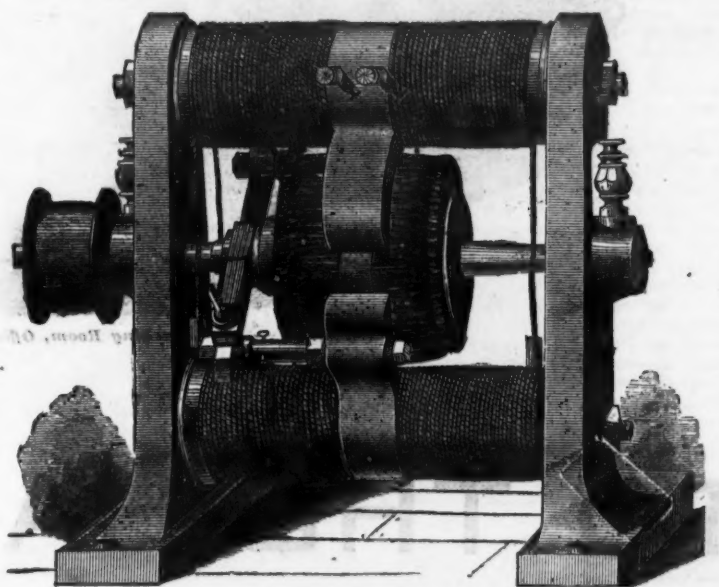


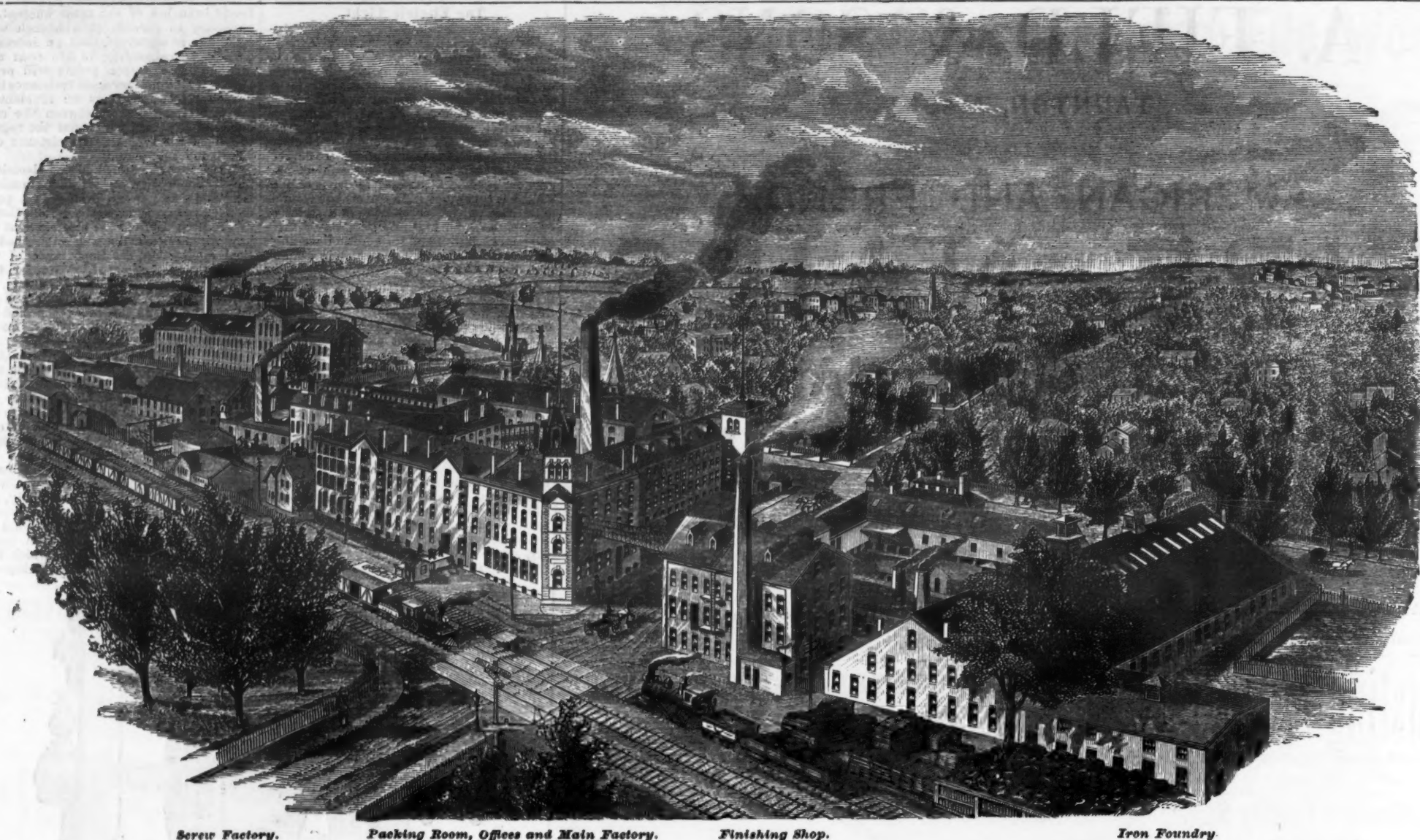
Fig. 1.—THE GRAMME MACHINE.

nounced in England than in this country,
has in a measure given way under the delib-
erations of calmer judgment, there is still
a strong inclination to consider the days of
the undisputed sway of gas and petroleum
as illuminants to have passed. Nothing has
been published, however, by which Prof.
Edison's claim, which rests alone on his
statement, is substantiated, and until this has
been done judgment on the applicability for
domestic purposes in direct competition with
present means of illumination, must be
suspended. Mr. Edison is not the first
who has confidently proclaimed as-
sured success, and we would recall to
memory that in the first quarter of the last
year L. Denayrouze claimed, before the
Academies of Sciences, with much enthu-
siasm, for Paul Jablockhoff, the great im-
provement of the divisibility of the electric
light which subsequent experience has not
sufficiently substantiated. Mr. Jablockhoff
introduced into the central circuit of the
machine the interior wire of a series of in-
duction coils, and interposed between the
two extremities of the exterior wire of each
coil a plate of kaolin, which, glowing with
the heat, was said to emit a beautiful light.
By varying the dimensions of the bobbins
and the diameter of the wire it was claimed
that small and medium lights could be ob-
tained by which carbon points, and with it
regulator lamps were done away with. Mr.
Jablockhoff has recently written to the
Correspondance Scientifique a series of letters,
in which he reasserts his claim, supplement-
ing it with the information that he has suc-
ceeded with a new apparatus, the "ampli-
fier," in distributing the electricity generat-
ed by any machine through a single conductor
to several points, increasing it at the same
time.

Dr. Siemens, alluding to the announce-
ment of Edison's discovery, gives the fol-
lowing description of the problem: "In
passing an electric circuit from a main con-
ductor into several or any number of
branches, the current divides itself between
those branches, according to the well-known
law of Ohm, in the exact inverse ratio of
the electrical resistance presented by each
branch. A current may thus be divided,
for instance, into 10 separate currents of
precisely equal force, if each branch is
made to consist of a wire of the same length
and conductivity; but if one of these wires
was again to be slit into 10 wires, present-
ing in the aggregate the same conductivity,
each of these wires would only convey 100th
part of the total current. In the same way
one of the minor wires might again be sub-
divided into branches, each of which would
convey an amount of electric current which
would be accurately expressed by the rela-
tive resistance of the branch in question,
divided by the total resistance of all the
branches put together. It would thus seem
that nothing could be more easy than to
divide a powerful electric current among as
many branches of varying relative impor-
tance as might be desired; but in the case of
electric lighting a difficulty arises in conse-
quence of the varying resistance of each
electric light or candle, due to the neces-
sary somewhat varying distance of the
carbon points from each other, upon which
the length of the luminous arc depends. In
order to work a number of lights upon dif-

found that when a magnet is introduced
into a coil of insulated wire, a current of
electricity is established which lasts only a
moment, and that on the withdrawal of the
magnet a second momentary current is
generated in the reverse direction. These
currents are called "induced currents."

Now as one current is always produced
when the magnet is introduced and another
when it is withdrawn, a moment's reflection
will show that if any means could be devised
by which a magnet could be introduced and
withdrawn with great rapidity, a nearly
continuous series of currents would be pro-
duced. Again, let us suppose that several
coils of wire and as many magnets are used,
and that some arrangement is introduced by
which the direction of the wires is changed
as rapidly as the magnets are inserted and
withdrawn, then it will follow that a prac-
tically continuous current of electricity
always moving in the same direction will be
produced. The continuity of the current
will be insured by the fact that some one or
other of the many magnets used will always
be entering or leaving a coil at a given instant
of time while the apparatus is in motion. The
mechanism used to produce this effect is called
a "commutator," a very important part of the
machine which is liable to rapid destruction.
When, therefore, a permanent magnet is
made to approach a bar of soft iron, it will
render it magnetic for the time being, which
causes the production of a momentary in-
duced current in the coil of insulated wire
surrounding the bar of iron and a frequent
repetition of such an approach, readily ac-
complished by placing a number of perman-
ent magnets in a shaft revolved by power,
will cause a large number of currents which
may be made to take one direction by the
action of a commutator. Such a machine
was the one of Pixii, improved afterward
by Ritchie, Saxton and Clark, which how-
ever produced only feeble currents. It will
be readily understood that to produce strong
currents large and strong rotating magnets
would be necessary, which would increase
the cost considerably. An early improve-
ment was therefore the revolving of the soft
iron bar with a coil of insulated wire, called
the "armature," as it will be seen that for
the production of electricity it is the same
whether the magnet moves past the soft
iron, or the latter past the former. Now a
number of armatures may be made to pass
by the field of one magnet, and the elec-
tricity generated be collected by simple
means. Or a single set of armatures may be
made to revolve before any number of sets
of magnets placed radially around the axis
to which the group of armatures is attached;
or both systems may be combined to produce
more power. The first machine of greater
generating power was invented 20 years ago
by Prof. Holmes. The machine, in a modi-
fied form, being still known as the "Alli-
ance." It consists of a framework of cast
iron, to which are attached radially and
symmetrically eight rows of compound per-
manent horse-shoe magnets, five on each
row, and each capable of sustaining over
100 pounds. These are so arranged on the
framework that opposite poles succeed each
other, both in each horizontal row, and in
each circular set; in other words, they are
arranged with alternate poles. There being
five magnets on each row, there are, of



TO THE HARDWARE TRADE OF THE WORLD.

We extend to all our friends in the trade our best wishes for a Happy New Year. We have now in press, to be issued about February First, a new and complete Illustrated Catalogue of American Hardware, embracing a full list of our own manufactures, and also of general hardware on sale at our several warehouses. As soon as the Catalogue is ready for delivery we shall take pleasure in furnishing a copy to each of our old friends and customers, and to as many new friends in the trade throughout the world, as, being properly introduced to us, may apply for the same.

Yours very respectfully,

RUSSELL & ERWIN MANUFACTURING COMPANY.

CORNELIUS B. ERWIN, President.

HENRY E. RUSSELL, Treasurer.

MAHLON J. WOODRUFF, Ass't Treasurer.

HENRY E. RUSSELL, JR., Secretary.

FACTORIES: New Britain, Conn., U. S. A.

WAREHOUSES:

NEW YORK, 45 & 47 Chambers, and 23 & 25 Reade Sts., M. J. WOODRUFF, Ass't Treas., Manager.

PHILADELPHIA, 425 Market Street, JAS. E. TERRY, Manager.

BALTIMORE, 17 South Charles Street, WM. H. COLE, Manager.

Cutlery.

FRIEDMANN & LAUTERJUNG,

Manufacturers of PEN AND POCKET CUTLERY.

Solid Steel Scissors, Shears, Razors,
Russia Leather Straps, Hones, &c.

Sole proprietors of the renowned full concave patent

"ELECTRIC RAZORS,"And the celebrated **"ELECTRIC SHEARS."** Nickel Plated
Hones.

Agents for the BENGALL RAZORS.

AMERICAN TABLE CUTLERY BUTCHER KNIVES, &c.

91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

MERIDEN CUTLERY COMPANY.

The "PATENT IVORY" HANDLE TABLE KNIFE.

The oldest manufacturers of Table Cutlery in America. Exclusive makers of the CELLULOID HANDLE
for Table Cutlery. A most beautiful and perfect substitute for Ivory. Also makers of all kinds of TABLE,
BUTCHER AND HUNTING KNIVES. Illustrated catalogues with prices sent to the trade on application.
No. 49 Chambers Street, New York.THE
LAMSON & GOODNOW
88 CHAMBERS ST. MFG. CO. N.Y.
GARDNER'S PATENT
AMERICAN TABLE
CUTLERY & C.AARON BURKINSHAW,
Manufacturer of Pen and Pocket Cutlery, Pepperell, Mass. Established 1853.
My Blades are forged by hand from the best Cast Steel, and warrant-
ed. To me was awarded the Gold Medal of the Conn. State Agricultural Society.
Office in New York with E. P. Whipple, 100 Chambers St.**NAUGATUCK CUTLERY CO.,**
Manufacturers of FINE PEN & POCKET CUTLERY.
FULLER BROS., Sole Agents, 89 Chambers and 71 Reade Sts., N. Y.

HALL, ELTON & CO.,

Electro Plated Ware, German Silver and Britannia Spoons.

THE "REGENT."
(Patented.)

Factories, Wallingford, Conn.

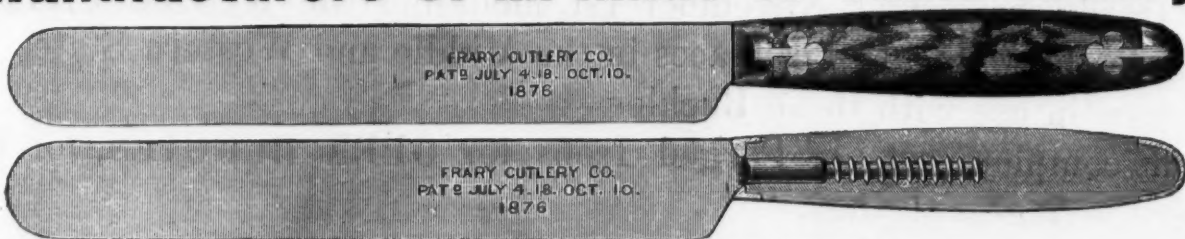
Salesroom, 75 Chambers Street, New York.

THE FRARY CUTLERY COMPANY,

FACTORY, BRIDGEPORT, CONN.

NEW YORK OFFICE & WAREHOUSE, with WIEBUSH & HILGER HARDWARE CO., 84 Chambers St.

Manufacturers of all kinds of Table Cutlery.



The above illustrations represent their New Patent Screw Tang Lock Fast Solid Handle Knife.

There is no question but that a solid handle knife is much more preferable than a scale tang. The great objection to their use hitherto is, that no solid wood handle
has been placed on the market with the handle properly secured—no handle put on with cement will stand the wear and tear of every day usage. The cement will expand
and contract with the action of heat and cold, and become loose, crack and come off, causing great prejudice against their use. This objection is overcome in our patent
screw tang. A wood screw is welded to the tang of the knife or fork, and screwed firmly and securely in the handle and locked there by the bolster, making a very strong
neat and handsome knife, which we warrant never to get loose, crack or come off. We manufacture a large variety of patterns, both Table, Butcher and Carvers, and
furnish the patent handle nearly as low as the scale tang. We are prepared to furnish this line of goods, together with the scale tang and iron handle, very promptly,
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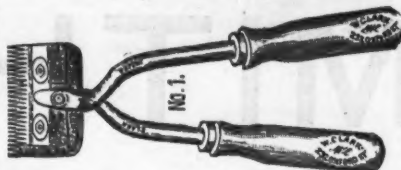
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are now furnished with Rubber, Bone, Stag
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WALTER SPENCER & CO.,

Steel and File Manufacturers,

Rotherham, ENGLAND.

CORPORATE MARK.

NOSPENCER
ROTHERHAM

Granted 1777.

course, four spaces between them, and in
these spaces revolve four bronze wheels,
each carrying 16 bobbins, corresponding to
the number of poles in each circular set of
magnets; there are, therefore, 64 bobbins
resting between the poles of 40 compound
magnets. The core of each bobbin consists
of a tube of soft iron slit longitudinally,
which form enables the magnetization and
demagnetization to be effected with less re-
sistance, consequently with less development
of heat, and, therefore, with a smaller ex-
penditure of power. The wires in all the
bobbins are wound in the same direction,
and the bobbins can be connected together
in series or in sets of parallel circuits, ac-
cording to the sort of current required.
From the above description it is clear that
at each revolution of the machine each core
has its magnetization reversed 16 times,
being magnetized eight times in one direc-
tion and eight times in the opposite; the 64
bobbins produce, therefore, no less than
1024 alternating currents for each revolu-
tion of the axis. This alternating current
is rather an advantage for the electric light
than otherwise, because it causes the two
carbon points to consume at an equal rate,
and, moreover, keeps them both tapered to
a point. When the electric light is pro-
duced by a continuous current, such as that
from a Gramme's machine or from a voltaic
battery, the positive carbon shortens at
twice the rate of the negative, its point be-
comes first flattened and then cup-shaped,
and the edges of this depression have a ten-
dency to cast a shadow, and a portion of the
light is lost.The Alliance machine has until recently
been considered one of the best, and it has
been quite extensively used for light-house
purposes, but for the lighting of industrial
establishments it is too large and too costly
compared to others of more recent date.
In the year 1854 Siemens introduced his
armature, which consists of a revolving cylin-
der of soft iron having a deep and wide
groove cut longitudinally along its opposite
sides and continued round the ends; in this
groove the wire is wound in a way that has
been compared to the thread upon a shuttle.
The poles of this armature are the two cylin-
dric faces; that is to say, those two por-
tions of the cylindrical surface which have
not been cut away in forming the groove.
This is the armature adopted by Ladd and
by Wilde, of Manchester. A most important
discovery—that of the reaction principle—
was made by Wheatstone and Siemens inde-
pendently, although they were each brought
before the Royal Society on the same day.
This reaction principle consists essentially of
the utilization of the residual or inherent
magnetism of the core of the electro-magnet,
and which is the property more or less of all
iron—whether circumtraversed by an elec-
tric current or not—for producing, in the
first instance, a feeble current in the wire
surrounding it. This current, feeble as it is,
is sufficient to increase the magnetism of the
core, and this increased magnetism reacts
on the wire, producing in it a still stronger
current. Thus mutual action and reaction
go on until, in a few seconds, the electro-
magnets are charged to the fullest extent
and the machine is working at its greatest
power. This is the principle upon which the
electro-magnets are excited in the larger
Gramme, the Siemens, Ladd, Wheatstone
and Varley machines. Wilde's later machines
embrace the same principle. Messrs. Bauer
and Haeb's machine, which is the most popu-
lar in Germany consists of a Gramme arma-
ture, revolving within a cylindrical box of soft
iron formed by the spreading out of the polar
extremities of the exciting magnets, so as
almost to envelop the rotating armature,
leaving but two narrow spaces separating
the poles from one another. In all other re-
spects it is a Gramme machine, which is the
most popular in France.The Gramme machine (Fig. 1*)—a modifi-
cation of the earlier Pacinotti machine—
consists of two cylindrical electro-magnets,
with their combined poles extended by
pieces of such shape as nearly to envelop the
armature which rotates between them. The
latter is composed of a ring of soft iron, over
which 60 coils of insulated copper wire are
wound, connected successively at their
ends. The loops thus formed between each
pair of coils are connected to the copper
strips of the commutator, the number of
which is equal to that of the armature coils.
They are placed radially edgewise around
the shaft of the machine, and insulated from
each other and the shaft, thus forming a
cylinder, the surface of which is composed
of alternate strips of copper and insulating
material. Upon the surface of the commu-
tator rest bundles of soft iron wire, by
which the currents generated in the arma-
ture coils are conducted to the external cir-
cuit. As the armature is rotated between
the poles of the field magnets, currents of
electricity are generated.Recently Mr. Gramme has designed a new
machine capable of generating alternate
currents, which are required for the Jab-
lookoff light.

(To be continued.)

Bismarck's Tariff Policy.—The Pro-
vincial Correspondence (semi-official) repro-
duces Prince Bismarck's letter relating to
tariff revision, and remarks that should the
system recommended therein secure a reve-
nue from some articles proportionately as
considerable as that derived by England and
America, there will be nothing to prevent a
reduction of the number of articles taxed
when taxation is found burdensome. The
proposed tariff will also be advantageous in
negotiating treaties of commerce, as Ger-
many can obtain concessions in return for
the relinquishment of duties.Example of Trade Depression.—The
depression of the iron trade is such that the
New British Iron Company have resolved to
close a very large portion of their great iron
works at Corbridge. It will be remem-
bered that Mr. J. P. Hunt, chairman of the
Ironmasters' Association, is the chief man-
ager of these extensive works, and has ar-
rived at the above conclusion with much re-
gret, in view of the very large number of
men who must forthwith be thrown out of
employment.* We are indebted to E. J. Knight, Secretary of
the Franklin Institute, for this and the following
illustrations.

I. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

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have, in order to meet it, greatly extended their
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Having largely increased our facilities for the manu-
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prices. The list price of the large size is now \$2.00
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formerly \$1.25. The material used in the manu-
facture of Young's Patent Folding Scissors is the
very best. All are nickel-plated and furnished with
a neat morocco case.

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Warranted made from

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SEND FOR PRICE LIST.

SARANAC HORSE NAIL CO.

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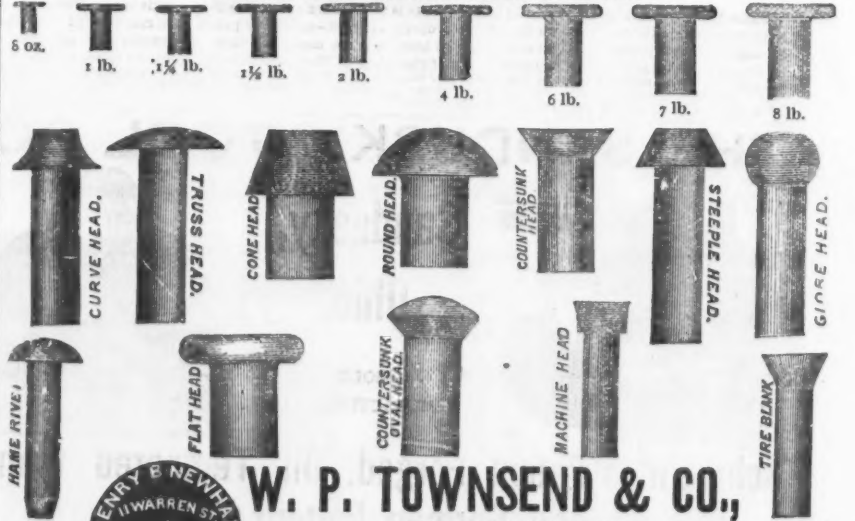
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IMPROVED without Belts, Bellows, Crank Pins, Dead Centers
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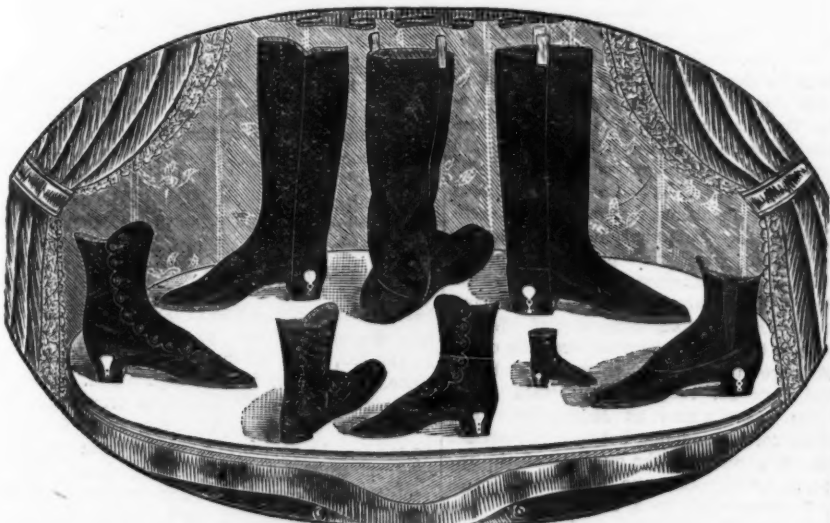
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NEW ONES KEPT STRAIGHT

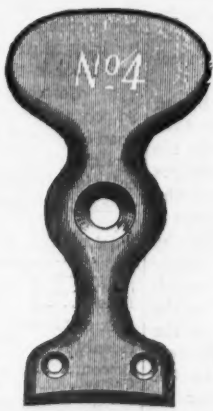
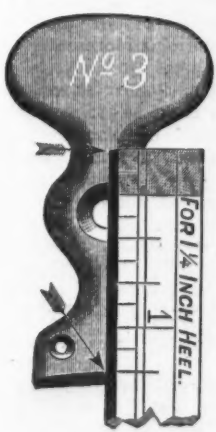
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These can be applied to any Boot or Shoe at any time by any one.



very Pair is warranted to bend to fit the boot without breaking.



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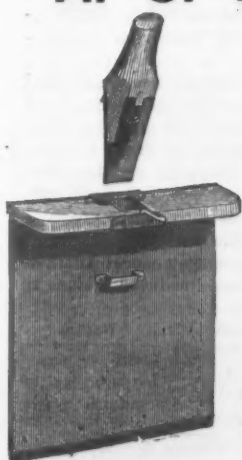
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As seen in the accompanying cut, the handle can be taken from the blade by throwing back the cam lever which holds it. On the end of the handle there is a steel point which makes a good Ice Chisel.

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A. G. COES PAT. DEC. 26, 1871

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The back strain when the wrench is used is borne by the bar—not by the handle. The strongest Wrench made, and the only successful Re-enforced Bar. None genuine unless stamped.

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Our Agents, GRAHAM & HAINES, 113 Chambers St., New York, carry a full line of our goods, and will be pleased to serve you at factory prices.

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Manufacturers of Calkers', Carpenters', Stone Cutters' Tin, Copper and Boiler Makers' MALLETs, Hawing Beetles, Hawing and Calking Irons; also all kinds of Handles, Sledge, Chisel and Hammer Handles. Also COTTON AND RALE HOOKS. Patented Feb. 13, 1877; a new combination of Hooks. 456 E. Houston St., New York City.

THE PRATT & WHITNEY CO., Hartford, Conn., U. S. A., Make specialties of

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W. & J. TIEBOUT, Manufacturers of Brass, Galvanized & Ship Chandlery Hardware, No. 290 Pearl Street, New York.

Scientific and Technical Notes.

Prof. John A. Church, of Columbus, Ohio, has read before the Chattanooga meeting of the American Institute of Mining Engineers a paper on the

HEAT OF THE COMSTOCK MINES, from which we take the following interesting data. Although subject to fluctuations which we shall refer to further on, the rock in the lower levels of the Comstock lode, near Virginia city, Nev., from which the enormous treasures of the Bonanza mines have been taken, appears to have a pretty uniform temperature of 130° F. In freshly opened ground it varied from 108° to 116° F., and higher temperatures are reported at various points, reaching in fact as high as 123 degrees in the 1900 level of the Gould & Curry. The temperature of the air is subject to more fluctuations than that of the rock, as it is artificially supplied to the mine and varies according to the distance to which it is carried, the quantity, velocity in the pipe and its initial temperature. "Hot" drifts are not usually above 108 to 112 degrees, though when they are very long they rise to 116 degrees. These limits are, however, not in the least degree true of the water which enters the drifts from the country rock, and also from the lode rocks. That approaches more nearly 150° F. The vast body of water which has filled the Savage and Hale & Norcross mines for more than a year, and from which it is safe to say 1,000,000 tons of water have been pumped within 12 months, gave a temperature of 154° F. It has been frequently noticed that some parts of the mines are hotter while others are colder than the average, and it seems that these hot areas lie in belts and are not irregular or promiscuously placed in the mass of east country rock. Hot belts are noticed in the vicinity of dykes, at the contact of diorite and propylite, and generally near the line of contact of two rocks. Again, there are cold belts which, though fewer in number, are more strongly marked. The rock is in such cases always wet, though on the other hand it is by no means certain that water indicates cold portions of the mines. The source of the heat is not, as has been supposed, the feeble remnant of a temperature that once reached the point of rock fusion, nor is it the oxidation of the sulphurets present in small amounts, as the following analyses of water from the vein prove:

	Savage, 600 ft. Grains pr. gallon.	Gould & Curry, 1700 ft. Grains pr. gallon.	Gould & Curry, 1800 ft. Grains pr. gallon.	Hale & Norcross, 1800 ft. Grains pr. gallon.
Silica.....	1.77	2.21	4.025	3.500
Chloride of sodium.....	0.13	0.04	1.162	1.327
Sulphate of lime.....	29.40	14.35	16.583	20.332
Sulphate of magnesia.....	1.77	0.91	1.162	1.327
Carbonate of soda.....	0.09	0.04	1.162	1.327
Carbonate of potassa.....	7.56	6.42	26.199	8.342
Carbonate of magnesia.....	2.98	0.05	trace	trace
Alumina & oxide of iron.....	0.05	trace	trace	trace

This table shows that the source of the heat cannot be the decomposition of a sulphide like pyrite, for the resulting sulphate would be highly soluble, and the water would be much stronger in sulphuric acid. The true source of the heat is probably the chemical alteration of the feldspathic minerals of the propylite and other rocks. This change consists apparently in the process of transforming feldspar to clay, technically known as kaolinization, from the fact that china clay, or kaolin, is produced in this way. It may be interesting to state that Prof. Church calculates the total quantity of heat carried out of the mines yearly by the water and air—approximately at 416,000,000 ton-heat units, to produce which, in ordinary industrial operations, would require 55,560 tons of anthracite, or 97,700 cords of wood. From the facts of the case and his explanations for them, Prof. Church answers the important question, Will the heat continue to increase as the mines grow deeper? in the affirmative. He thinks that the heat in the mines is subject to a steady and moderate increase as their depth is increased, this comparatively regular progression being broken by the passage through belts of rock heated above the average of the "country."

Now that the DUPLEX-SYSTEM OF TELEGRAPHY FOR CABLES seems to have been successfully applied to the Atlantic cables with an increase of working capacity of 70 per cent., it may be of interest to cite the following data on other submarine cables, as given by Sir James Anderson: On the Malta-Marseilles cables, a distance of 825 miles, 15 words per minute are worked simplex, 26 words duplex, an average of 84 per cent. As far back as March, 1877, the working increase of speed upon the Bombay-Aden cable, which in electrical capacity about equals the Anglo-American cables, was 40 per cent. Upon the Aden-Suez cable, a distance of 1460 miles, the increase was 60 per cent. Sir James Anderson states that a steady increase of 70 per cent. can be commanded in favor of duplex over simplex.

Messrs. Giles, Hopkins & Co. have just completed an order for two miles' length of WOOD'S WROUGHT IRON SLEEPERS AND CLIP CHAIRS.

These sleepers are about to be put down on the railway between Middlesbrough and Easton, over which very heavy traffic passes, in order fully and fairly to test their capabilities. If they answer expectation they will probably soon come into general use and supersede the present wood sleepers. The patent sleeper is extremely simple in construction. It consists of an inverted trough, and through square holes punched in this trough a clip chair of rolled wrought iron or cast steel is slipped from the under side. The clip chair is of horse-shoe shape, one side forming a hook about 2 1/2 inches wide, and the other side is like one jaw of an ordinary railway chair for taking a wooden railway key. The wooden key fastens the rail tightly upon the sleeper, as well as holding the clip chair in its place. M. de Cyon has recently completed a series of experiments on the

PHYSIOLOGICAL ACTION OF BORAX, of importance as bearing on the applicability of that substance for preserving meat. He fed dogs, in one series of experiments, on meat preserved by M. Jourde's process, and in another on fresh food to which various

quantities of borax were added. It was found that borax added to meat to the extent of 12 grams daily (which is 10 times what the Jourde process requires), may be taken in diet without causing the least disorder of general nutrition. Further, borax substituted for marine salt increases the power of assimilating meat, and may greatly increase the weight of an animal, even when the aliment is exclusively albuminoid.

A discovery of some importance to dyers has been made by M. Grawitz, the SUBSTITUTION OF CHROMIUM FOR VANADIUM SALTS

in the formation of black with the salts of aniline in presence of chlorates. The chromium salts act even more energetically than those of vanadium; one-tenth part of bichromate of potash per 125,000 parts of aniline salts, dissolved in water, still developing black.

Mr. Matthieu Williams, writing to the *Journal of the Society of Arts*, says that he has found an effective

METHOD FOR CLEANING DIRTY FILTERS, using for that purpose permanganate of potash. There can be no doubt that passing a solution through the filter until it comes out as pink as when poured in must be beneficial, but some doubt has been expressed as to whether it would destroy bacteria and their germs.

The Engineer has an illustration of BAGSLAW'S RELIEF VALVE, which consists of a piston moving in a small cylinder, the lower end of which, containing a valve, is connected with the cylinder, while the space above the piston is in communication through a pipe with the valve-box. The piston is directly connected with the valve below, which is opened by the action of a coil spring operating directly upon the piston, the surface of which is somewhat greater than that of the valve. When the engine is standing there is no pressure on the piston, which consequently allows the coil spring to open the valve and let all condensed water run off as soon as formed, thereby preventing that accumulation of water an interval of rest which has been the cause of so many cracked cylinders and serious accidents. Immediately steam is turned on to start the engine it has access to both the valve and piston, and the latter having the greater area, presses down the valve and keeps it closed as long as the engine is working properly. Should, however, the boiler prime, and water gain access to the cylinder, the valve will open automatically and relieve any excess of pressure before rupture of any part can take place. Thus the pressure of steam acts on the valve exactly as a spring or dead weight, with this advantage, that it cannot be over-weighted, and any desired margin of safety can be obtained by enlarging or reducing the area of piston. The stop cock enables the attendant to open the valve, while the engine is working, at such times as he wishes to use it like an ordinary drain tap, and neglect to open the stop cock in no way affects the safety of the cylinder.

M. Olivier Mathy, a Neuchâtel chemist, communicates to a French periodical the following data on the

COMPOSITION FOR PHOSPHORESCENT WATCH DIALS,

which have been exhibited in this country for some time. The dials are usually made of paper or thin cardboard, enameled like visiting cards. They are covered with an adhesive varnish, or with white wax mixed with a little turpentine, upon which is dusted with a fine sieve powdered sulphide of barium—a salt which retains its phosphorescence for some little time. The sulphides of strontium and calcium possess the same property, but lose it more quickly than the former. After the dial has remained in darkness some days it loses its phosphorescence, but this may be readily restored by exposure of an hour to sunlight, or, better still, by burning near the dial a few inches of magnesium wire.

St. Paul Island Power Co.—Some very important negotiations between the Island Power Company and the St. Anthony Falls Water-Power Company were brought to a close at the end of last month. The St. Paul Pioneer of the 30th says: The Island Power Company, incorporated by Messrs. W. W. Eastman and A. B. Barton, of this city, and Messrs. John L. Meriam and A. H. Wilder, of St. Paul, have bought of the St. Anthony Falls Water-Power Company five hundred horse-power of water, to be taken on their main dam on the east side of and extending to the foot of Nicollet Island. This means business. The Island Power Company propose to build up a manufacturing center on the lower end of Nicollet Island, and as the first step will at once enter upon the construction of an immense building, to be leased, with power, for manufacturing purposes. The building will be five hundred feet long by sixty feet in width, and two stories in height above the basement, which makes it to all intents and purposes a three-story building. It will be located on the east side and at the lower end of the island; will be built of stone, with iron roof, and divided by fire-proof walls into the equivalent of twelve rooms, each sixty by one hundred feet. These rooms will be supplied with shafting and rented to parties desirous of engaging in various branches of manufacturing. One hundred and fifty horse-power of water will be sufficient to drive all the machinery in this building, work upon which will be commenced at once, and it will be completed and ready for occupancy by June 1, 1879. The Island Power Company will then have three hundred and fifty horse-power, with four acres of land, remaining to be utilized in other manufacturing enterprises, which will doubtless spring into existence at an early day. The location is convenient and accessible—only about four blocks distant from the City Hall—and the enterprise supplies a deficiency long felt and often earnestly discussed by the Board of Trade. There has for years been a demand, constantly increasing, for rooms to lease with power, and the Island Power Company's scheme fills the bill. It is an enterprise which can but prove remunerative to its originators and immensely valuable to the city.

The Iron Age

Metallurgical Review.

New York, Thursday, January 2, 1879.

DAVID WILLIAMS, Publisher and Proprietor.
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The new Weights and Measures act of England promises to give rise to some trouble between employers and employed. It is a fact not very well known in this country that the prices paid per ton for mining, puddling, &c., is for a ton of 2400 pounds, and not of 2240—a fact which makes considerable difference in comparisons. For example, puddling is 7s. 6d. in South Staffordshire, or, at 24 cents to the shilling, \$1.80 for 2400 pounds. Reducing this to the basis of 2240 pounds, it is \$1.68. This is for doing what in this country at the largest works costs from \$3 to \$6. After January 1, under the operation of this act, the long ton of 2400 pounds will be abolished and the ton of 2240 pounds be used. Workmen are already giving notice that they will expect the same wages for the smaller as for the larger ton, which is virtually a demand for an increase of 7 per cent. Under existing conditions their chance of getting it is extremely small.

The Old Year and the New.

The year which closes as these pages go to press is one that does not afford material for a pleasant retrospect, regarded from a commercial standpoint. Its events as concerns the metal markets are shown in the annual reviews which we print in this and succeeding issues. These are prepared with great care by members of our staff, and will be found to give a clear, correct and condensed history of the course of trade for the past twelve months. It is unnecessary that in this article we should dwell upon details.

Generally speaking the year 1878 will be remembered as the darkest within the experience of the present generation of business men. Hundreds who were proof against the shock of panic have been compelled to yield to the steady, unremitting pressure of hard times. The continued shrinkage since September, 1873, has taxed the resources of the strongest concerns, absorbed accumulations of capital and defeated the best efforts of commercial enterprise. When the panic of 1873 burst like a storm over the country, few were wise enough to see what the future would bring forth. The tornado seemed for a time to pass over the heads of merchants and manufacturers and expend its fury upon great banking corporations and the railroad schemes with which they were identified. The legitimate business interests of the country seemed to be founded upon a rock; but when the shrinkage began and continued year after year, the rock crumbled into sand and the sand washed away.

That the hope of improvement which has so long sustained the failing courage and stimulated the flagging energies of our manufacturers and merchants seems likely to be realized in the immediate future, relieves the gloom which otherwise characterizes the closing hours of 1878. The shrinkage of values seems to have reached its limit when gold and currency meet on the par line, and the recuperative powers of nature are already at work to revive our national energies and quicken the sluggish pulses of trade. We have learned from long and disheartening experience that the promise of the future often fades and recedes as we approach it; but in looking forward with eager impatience to the probable happenings of the new year, we are but in sympathy with the confidence which finds expression among all classes of business men. Compared with that of Great Britain, our present condition gives cause for congratulation rather than complaint, while our prospects for the near future are incomparably brighter. At peace with all the world, with a credit strengthened by proof of national good faith, abundant harvests, a trade balance before which our foreign indebtedness is melting away, and no entangling alliances of any kind, we have cause for much satisfaction with ourselves and our surroundings. If the trades we address find nothing encouraging in the immediate outlook, it is a satisfaction to know that an improvement in general trade must be reflected sooner or later by the iron and metal industries of the country, and that these, though slow to recover, are less sensitive to depressing influences than many others. It also gives grounds for encouragement that during the past four years the economies of all processes have been carefully studied, and that we are now in a better position than ever before to profit by an increased demand at home and abroad.

Of one thing we may be sure. In all the events of recent years there has been nothing to show that the principle of protection to domestic industry is a mistake, or that any advantages can result from free trade which would compensate us for the surrender of present benefits. The wisdom of those who have defended our tariff system is amply vindicated, and stands to-day unchallenged save by those who would profit by the destruction of American industry.

A Copper King.

It has not been without some pride that modern writers have dwelt upon the marvelous success achieved by the enterprise and ability of men prominent in some industry. This country boasts of great railroad magnates. England has its cotton lords and iron barons, who vie with the champagne, silk and chocolate nobles of France. Chili is now mourning its copper king, Don José Urmeneta, whose career is well worth a passing notice, especially as an early business education in this country may have done much to influence his success. Don José, born in 1803, was left an orphan when ten years of age. His brother, an intelligent merchant, sent him five years later to Providence, R. I., a step which draws from his enthusiastic Chilean biographer a sorrowful comment upon the "country" where the ice leaves the ground for four "months in the year only, but never thaws in the hearts of its people." Urmeneta survived the terrors of several Rhode Island winters, and returned home after having been instructed in a business college for four years, where he seems to have learned enough to appreciate the excellence of American manufactures, for we find him making his first business venture in taking from Providence a large amount of goods, realizing a profit of \$500 per case. He set out again at once for England, France and Spain as a partner in a firm established with two others, which, however, ceased opera-

tions on account of the troubles in Spain. Urmeneta then went to England, where he spent four years. After his return to Chili he settled down to farm life, and turned his attention to some old abandoned copper mines at Tamaya, which, according to family traditions, had been very rich. For 14 years he devoted all his energies to the development of these mines with that untiring zeal which is so often characteristic of prospectors and miners. In 1849 his labors were rewarded by the discovery of rich oxidized copper ore in immense quantities in the Pique mine, which in 20 years turned out as much as \$10,000,000. Together with Carlos Lambert he developed the methods of treating the sulphurets of copper which the inexperienced miners of Tamaya rejected. He erected great establishments at Guayacan and Tongol, contracted with Meigs for the construction of a railway from the latter place to the mines for \$700,000, encouraged coal mining in the South of Chili, developed the wealth of the province of Atacama, and was always one of the foremost in aiding industrial enterprise. He was a philanthropist, or, as our Spanish chronicler puts it, he "hid under the cold" civility of an English gentleman one of "the noblest and most genuinely Chilean hearts."

Unconscious Testimony to the Value of American Ideas and Manufactures.

It is in no boasting spirit that we from time to time refer to the changes that are taking place in England in reference to American ideas and American manufactures. We have believed that our industrial policy has been the right one, and that events would justify its wisdom. We have had faith in the growing excellence of our manufactures, whether that excellence be tested by quality, variety, adaptability or cheapness, and have believed that this would in the end be acknowledged. Consequently, when the wisdom of our course has been justified and the excellence of our products conceded, we have felt it due to our readers that the facts be laid before them.

In a recent issue we gave some extracts from one of our English contemporaries, showing how, unconsciously in all probability, a large and influential class of English manufacturers were abandoning the supposed impregnable arguments of free trade and intrenching themselves in those that protectionists have been using. For example, the *Engineer* says:

A favorite argument with protectionists is that the imposition of heavy duties on imported goods fosters home manufactures to such an extent that native goods can at last be sold at lower prices than those which must have been paid for them had they been imported duty free. This has been stoutly denied by the free trader; but we venture to think that the denial has not invariably been justified by the facts. If, for example, we take the iron trade of the United States, it will be found that protection has done so much for it that rails and bars and girders are sold to the American consumer at about the same price as that which similar articles fetch in English markets. As far as the American consumer of iron is concerned, he is rather the better for protection than the worse—a fact opposed to all accepted theories of political economy. What is true of the iron trade of America is true of other trades in other countries. Protection so developed the manufacture of sugar in France that she can now export it to England, while our own sugar refiners are undersold and the trade has been ruined. It must, we think, be admitted that the immediate result of protection is that it attracts capital and does undoubtedly develop manufacturing industries.

If the foregoing had been read to the average English ironmaster, and he had been asked to "guess" from what journal it was taken, he would have said the *Bulletin of the American Iron and Steel Association* or *The Iron Age*. It would never have entered his head that it was from the most extensively circulated of the English technical journals. Had these same words appeared in *The Iron Age* five years ago, our friends on the other side would have pitied our ignorance of the first of the "broad principles" of political economy, and read us a lecture on the comprehensiveness of our misconceptions. Now it is beginning to be accepted as good doctrine. John Stuart Mill was roundly berated for suggesting that there might be circumstances in which it would be advisable for a country to adopt a protective tariff, but his followers and admirers have taken especial care to point out that the United States was not in such a position. The error of political economists seems to have been that they have dealt with the ideal man who does not exist.

We find in the last *Ironmonger* at hand another unconscious admission of a fact that has for some years been claimed to exist by our steel manufacturers, and as strenuously denied by English periodicals and manufacturers. Some four years ago the last and most determined attack was made on the duties on steel in this country. A so-called "Steel Consumers' Association" was formed, petitions circulated, statements made and a very exhaustive hearing had before the Committee on Ways and Means. It happened that the question of the fitness of American steel for axes was quite thoroughly discussed. One of the largest manufacturers of axes in the country stated positively that he could not use American steel, and this was the cry of other ax manufacturers. Indeed, it seemed from the testimony that axes were the one thing for which American steel could not be made suitable. Now how is it? In the *Ironmonger* of Dec. 7, 1878, is an article on English and American axes, in which appears the following:

Quality apart, the newer axes (that is the axes made in England on the American pattern), however, are not yet cheap enough to induce the

members of the retail trade at home, exporters and importers over sea, to give them an extended trial, the fact being, we are told, that the Collins axes are actually being offered at lower prices, free in London, than English-made axes on the same patterns. The Collins 7-lb. axes are to be had here at something like 5s. 6d. per dozen, net—in large lots—whereas the best English made, which average about 6 lbs. each, cannot be obtained at anything under 1s. 7d. or 7s. 6d. per dozen, which price does not include charges for packing, as is the case with the "Yankees." It is self-evident that this ought not to be the case, and that if it is so here, where our manufacturers are on their own ground, it is likely to be much more developed in the colonies and elsewhere outside our own particular boundaries. The Collins axes in particular have a well-deserved reputation, and the success they have achieved can only be upset by offering equally good and well-finished articles at the same or lower prices.

To those who remember the hearing before the Committee of Ways and Means, this is a complete refutation of the arguments in favor of the reduction of the tariff on ax steel. Collins & Co. do not use a pound of foreign steel. Their entire consumption is made in their own factory, and yet, notwithstanding the assumed fact that the tariff is a tax, and that they have no drawback for duties paid on goods manufactured from imported raw material, they are exporting and selling a 7-lb. ax in London at 16s. per dozen less than a 6-lb. ax of, we presume, a somewhat similar pattern, the Collins ax being, we judge from the article, conceded to be as good as the English one, if not better. This shows two things: First, that American steel can be and is used in making an ax that competes in quality with axes made from English steel; second, that axes made from it can bear the freight across the Atlantic and still be sold lower than the English axes made from English steel. These unconscious testimonies to the truth of American industrial ideas and the quality of American manufactures, are more valuable than they would be if they were direct and positive.

The Siemens-Martin Discussion.

During the Paris Exhibition the Society for the Production of Martin Steel, successors to Emil and Peter Martin, distributed a pamphlet in which they claimed that the credit of having invented and perfected the open-hearth steel process belonged to Martin alone. Dr. Siemens, of London, demanded the retraction of this document and the substitution in its stead of a paper setting forth his claims of priority, the merits of his regenerative system, and honorably mentioning the perseverance of Messrs. E. & F. Martin in developing the process. Finding that this proposal was rejected by the company, Dr. Siemens published the entire correspondence, together with drawings, in pamphlet form. He states in one of his letters that he had worked at the solution of the problem of melting steel on an open hearth since the year 1856; that in 1861 he took a patent on it, which was put into practical operation by Atwood and by Messrs. Boignes, Rambourg & Co., of Montluçon, France. He calls the attention of Messrs. Martin to the fact that on the occasion of his first negotiations with them, in a letter dated May 26, 1863, he informed them of the experiments at Montluçon. The further correspondence between the parties seems to show that the question of the application of the Siemens regenerative system referred only to a crucible steel furnace; that Siemens' idea of building an open-hearth steel furnace was a novelty to the Messrs. Martin, who, in consequence of Siemens' urgent requests, agreed to the condition that the furnace to be built was to be a reheating furnace, which might at a small expense be altered into an open-hearth steel furnace.

The first furnace at Sireuil was begun according to Mr. Siemens' plans on the 17th of April, 1863, and put into operation by his engineers. Mr. Siemens then acknowledges that after 1864 the Martins followed out the process with great perseverance, and that it was especially the proper admixture of the materials which they studied. It was only in 1867, after having concluded their experiments and begun regular work, that the Martins took a new patent, in which the main points of the open-hearth steel process were embodied, as they were also in the patent granted in the same year to Siemens. The Martin patent contains recipes for the production of cast steel capable of being hardened, of a homogeneous metal which will not harden, and of a "mixed metal," a mixture of cast iron and steel. These recipes do not now possess any practical value.

Some interesting data in regard to this question were brought out in a debate before the Bergu. Hüttenmaennische Verein für Steiermark u. Kärnten. Prof. Kupelwieser, in the course of this debate, stated that in his opinion neither Siemens nor the Martins originated the open-hearth process. He calls attention to the fact that Prof. Gruner, in a paper published in the *Annales des Mines* in 1868, mentions the description in an article in Hassenfratz's *Siderotechnik*, 1812, of a process used in an English iron works of melting cast and wrought iron in a reverberatory furnace, sampling, then ladling and casting. This process was taken up again, and in the years succeeding 1850 similar experiments were made by Col. Alexander at Brest—without result, however, because a very poor grade of pig was used. The process was not new either in France or in England. There is no doubt, however, that it could not be successful the less temperatures such as produced by Siemens regenerative furnace were employed. Both Prof. Kupelwieser and Director Sprung held that no royalties need

be paid in Austria on the Martin process. The following resolution, offered by the Chairman, Prof. Tunner, was passed unanimously:

1. The principle of the production of cast steel in a reverberatory furnace was known in England before the year 1812, and in 1860, Sudre, under orders from Napoleon III, carried it out quite successfully on an open hearth in the Montluçon Works.
2. The idea of melting steel in the Siemens furnace originated with Siemens in the year 1862, and Martin built a reheating furnace which might be cheaply, according to Siemens' directions, altered into a steel furnace. In April, 1863, Siemens' engineers built the first Siemens-Martin steel furnace at Martin's works at Sireuil.
3. In the year 1864 Martin found the proper additions for various grades of steel, and received a patent on them August 15, 1865. The furnace shown in the drawing on this patent is identical with Siemens' construction, and Siemens' drawing was also added to the subsequent patent of August 21, 1867.
4. Martin can claim priority for his additions only.
5. But as these additions have been entirely superseded by the manipulations based upon more recent experience, Martin's patent is without value.
6. As far as we know, Martin has been rejected in France also, nobody there paying patent royalties.

Whether all this has any interest for those using the Siemens-Martin process in this country is for them to determine.

The English Failures and Late Trade Statistics.

The continued financial troubles in England and the exemption therefrom in France, lend special interest to a comparison between the trade of these countries during the first ten months of 1877 and 1878. The following has been the general movement in merchandise from Jan. 1 to Nov. 1, in millions of dollars.

	England.	France.
1877.	1878.	1878.
Import.....	1,646	1,566
Export.....	830	811

Total.....2,476 2,377 1,756 1,383
It will be seen that while the imports into France increased 20 per cent. during the period named, English importations show a decrease of 5 per cent.; that French export decreased 4 per cent., and that of England only 2½ per cent.

Chief among England's imports we find the following items of raw produce, all showing a notable decrease, principally by reason of the enormous decline in values:

	1877.	1878.
Raw sugar.....	\$2,241,095	\$68,902,815
Cotton.....	143,962,663	135,724,760
Wool.....	113,177,010	106,705,193
Flax and hemp.....	34,138,990	24,619,900
Silk.....	17,064,175	15,219,865
Lumber.....	55,432,845	40,559,192
Timber and dyewoods	24,913,735	18,281,825
Soap and stearine.....	12,061,545	8,100,035

Total.....\$490,991,090 \$418,206,983
The import of sugar has decreased from 14,000,000 cwt. to 12,000,000, that of cotton 223,000 cwt.

The import of breadstuffs, with the exception of wheat, on the other hand, shows a remarkable increase. Thus flour has risen from 5,804,470 cwt. to 6,389,411, Indian corn from 26,000,000 cwt. to 38,000,000, barley from 9,000,000 to 11,000,000. Wheat has decreased from 42,771,355 cwt. to 42,182,102, and the price having declined since, the amount is \$15,000,000 less. The importation of cattle has risen from \$14,381,640 to \$24,045,140, sheep rose from \$9,108,645 to \$9,400,140, bacon from \$24,049,515 to \$27,741,840, butter increased 120,000 cwt. and cheese 280,000 cwt., potatoes from 4,531,491 cwt. to 7,514,979. Tea has increased only \$1,420,000. Wine shows a decrease from 16,312,693 gallons to 13,795,985, and in value from \$29,321,645 to \$25,118,495. The import of silk goods has increased, dress goods being represented by \$34,308,915 against \$33,592,930 last year, and ribbons by \$10,216,675 against \$7,200,770. Cotton goods rose from \$7,512,900 to \$9,707,450. Manufactures of iron have been imported to the extent of \$7,203,550, against \$6,275,545 last year. Foreign and colonial articles re-exported show an increase in the following items:

	1877.	1878.
Wool.....	from \$52,271,025	to \$52,649,735
Tea.....	" 9,676,900	" 10,580,080
Silk.....	" 5,425,530	" 6,549,405
Rice.....	" 7,225,180	" 10,271,055
Hides.....	" 4,343,140	" 4,499,770

A decrease in the following items is noticeable:
Cotton.....from \$16,067,650 to \$13,294,040
Coffee....." 22,507,725 " 20,239,870
Indigo....." 5,705,760 " 5,533,595

Among the items having reference to the main articles of British manufacture cotton goods stand prominent, and show a decreased export of \$16,862,130, the total being \$222,386,780, against \$239,248,910. Woollens have declined from \$72,876,145 to \$70,506,635. Millinery rose from \$15,938,830 to \$16,670,195, while linen declined from \$25,243,675 to \$23,760,550. On the other hand, woolen yarn has risen from \$14,765,455 to \$16,448,005, and twist from \$50,671,115 to \$54,717,195.

The iron and steel export has diminished in quantity comparatively little, having been 1,956,284 tons, against 1,986,322 last year, but in value the decrease is from \$84,546,365 to \$78,057,195. Copper, on the other hand, rose from \$12,664,650 to \$13,366,230; coal from 13,181,103 tons to 13,258,519.

Turning our attention to the French statistics, we find the following general subdivision, in which we have reduced values to thousands of dollars:

	Import.	Export.
1878.	1877.	1878.
Raw Produce.....	\$376,066	\$335,180
Food.....	246,144	163,408
Manufactures.....	74,476	67,837
Other Mde.....	35,304	36,645

Total.....\$731,886 \$605,044 \$550,713 \$570,566
The chief articles constituting raw pro-

AVERAGE COST PER TON OF PIG IRON ON FURNACE BANK, AND OF MERCHANT BAR IN MILL, FROM 1850 TO 1879.

COMPILED FOR *The Iron Age* FROM ORIGINAL DATA, BY MR. W. E. S. BAKER, SECRETARY OF THE EASTERN IRON MASTERS' ASSOCIATION.

AVERAGE COST OF PIG IRON, 1850 TO 1879.

	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878
																								Mar. 1	Mar. 1	Mar. 1	July 1	Jan. 1	
Cost of Ore to the ton of Pig Iron.....\$	5 75	5 44	5 55	5 97	6 65	7 51	7 50	7 75	7 66	7 08	7 45	7 35	7 08	7 49	9 12	13 13	13 19	11 71	10 92	11 86	12 96	12 67	13 64	14 37	14 75	11 95	9 54	7 69	6 51
Cost of Coal to the ton of Pig Iron.....	3 70	3 36	3 65	3 23	3 53	4 63	3 90	3 80	4 06	3 26	3 49	3 26	3 68	3 43	5 41	9 66	7 55	4 44	7 11	7 41	7 08	8 59	7 28	7 45	7 90	8 01	6 79	4 93	5 29
Cost of Limestone to the ton of Pig Iron.....	93	96	1 09	1 06	1 38	1 26	1 16	1 14	1 18	1 15	1 21	1 17	1 11	1 20	1 98	2 85	2 65	2 76	2 51	3 14	2 44	2 08	2 04	1 98	2 03	1 14	1 01	81	78
Cost of Labor to the ton of Pig Iron.....	2 22	1 61	2 02	2 00	2 45	2 85	2 58	2 30	2 10	1 82	1 87	1 97	1 57	2 07	2 85	4 56	3 46	3 99	3 86	3 46	3 89	3 54	4 69	5 11	4 40	2 97	2 54	2 02	1 86
Cost of General Contingencies.....	1 65	1 98	2 03	2 62	1 99	2 62	2 91	2 16	2 73	2 83	2 83	2 86	2 67	2 35	1 66	2 01	2 03	1 98	1 90	1 96	3 67	2 77	2 93	3 00	2 39	2 10	1 73	1 65	1 29
Cost at Furnace Bank.....	14 25	13 30	14 34	14 88	16 00	18 87	18 05	17 24	17 73	16 14	16 85	16 61	16 11	16 53	30 97	32 21	27 88	27 88	26 30	36 83	30 04	29 65	30 58	32 41	31 47	26 17	21 61	17 10	15 73
Add interest on capital on a product of 6000 tons....	1 05	1 05	1 15	1 22	1 37	1 29	1 21	1 47	1 22	1 28	1 36	1 57	1 57	1 40	1 59	1 61	1 64	1 80	1 63	1 71	1 85	1 83	1 75	2 03	2 00	1 70	1 50	1 26	1 15
Total cost to the producer.....\$	15 30	14 35	15 49	16 10	17 37	20 16	19 26	18 71	18 95	17 42	18 21	18 18	17 68	17 93	22 56	33 82	29 52	29 68	27 93	28 54	31 89	31 47	32 33	34 49	33 47	27 87	23 20	18 36	16 87

AVERAGE COST OF BAR IRON, 1850 TO 1879.

Cost of Pig Iron to the ton of Finished Bar Iron.....\$	25 65	24 90	25 71	25 25	42 17	42 64	32 84	33 34	30 61	26 54	25 61	25 35	24 36	27 90	41 40	68 60	50 77	50 64	44 53	43 29	43 63	40 52	49 11	43 24	41 20	39 13	35 19	31 93	29 13
Cost of Coal to the ton of Finished Bar Iron.....	5 70	5 61	5 61	5 81	6 00	8 28	6 59	6 00	5 49	5 17	5 27	5 39	6 19	7 66	8 44	13 03	8 92	9 13	8 61	8 33	8 55	7 55	8 43	8 55	8 46	8 73	6 85	5 89	6 01
Cost of Labor to the ton of Finished Bar Iron.....	10 43	10 17	10 37	11 06	15 12	14 70	12 85	13 06	11 77	10 68	10 90	11 12	11 78	15 14	18 94	27 45	20 61	22 02	19 87	20 65	18 57	17 70	21 55	20 37	19 02	16 87	15 74	12 93	11 98
General Contingencies.....	4 64	4 83	4 88	7 05	10 39	10 78	8 88	10 38	10 84	7 91	8 78	8 71	10 03	7 66	9 15	18 03	11 50	9 44	7 70	7 75	7 03	7 85	5 74	5 83	5 29	4 79	4 73	4 62	4 41
Cost in the Mill, finished.....	46 42	45 51	46 57	49 17	73 68	76 40	61 16	62 78	58 71	50 30	50 56	50 57	52 36	58 35	77 93	127 11	91 80	91 23	80 74	80 02	77 78	73 62	84 83	77 90	73 97	59 51	52 51	45 37	42 33
Add interest on capital on a product of 6000 tons....	1 56	1 49	1 54	1 50	1 80	1 63	1 59	1 89	1 65	1 60	1 71	1 90	1 75	1 77	1 80	2 80	2 01	2 05	1 96	2 09	2 15	2 20	2 22	2 25	2 10	1 86	1 70	1 35	1 30
Total cost to the manufacturer.....\$	47 98	47 00	48 11	50 67	75 48	78 03	62 75	64 67	60 36	51 90	52 27	52 47	54 11	60 13	79 73	129 91	93 81	93 28	82 70	82 11	79 93	75 82	87 05	80 24	76 07	61 37	54 21	46 72	43 83

Quantity of Ore used to make 1 ton of Pig Iron, average of 10 years.....tons, 2.15-1.17
 Quantity of Coal used to make 1 ton of Pig Iron, average of 10 years....." 1.14-3.27
 Quantity of Limestone used to make 1 ton of Pig Iron, average of 10 years....." 16-1.06
 The above group of furnaces used Juniata and Montour Hematite Ores, and a little Cornwall.
 The coal came chiefly from the Wyoming and Lehigh Valleys.

Quantity of Pig Iron used to make 1 ton of Finished Bar Iron, average of 10 years.....ton, 1.04-1.13
 Quantity of Coal used to make 1 ton of Finished Bar Iron, average of 10 years....." 1.12-2.03
 The above rolling mills used Gray and White Pig Iron and Broadtop and Cumberland Coal.

Pig.....1.3-0.0
 Coal.....1.10-0.0
 6000 Tons.

duce show the following increase of import:

	1878.	1877.
Wool.....	\$60,775,400	\$57,408,600
Silk.....	38,961,200	36,686,400
Cotton.....	37,861,400	34,939,600
Hides.....	26,886,800	24,964,200
Lumber.....	26,940,000	24,518,800
Coal.....	25,555,800	25,879,000
Seeds.....	18,391,200	16,953,000

Total.....\$255,771,800 \$214,419,600
 An increase of export is shown in the following items:

	1878.	1877.
Wool.....	\$16,339,400	\$13,343,400
Silk.....	22,758,800	20,598,600
Cotton.....	13,899,200	12,479,800
Hides.....	7,837,200	6,854,400
Seeds.....	4,444,400	4,246,800
Ornamental feathers.....	6,016,600	5,647,400

Total.....\$71,335,600 \$63,170,200

The bulk of the excess of importation into France during the ten months is represented by goods of all kinds, principally grain and flour, the import of which during the corresponding period of 1877 amounted to the moderate sum of \$31,463,200, but this year increased to \$85,234,000. A further important increase took place in cattle, coffee, greases, meat, wine, oleaginous seeds, cheese, butter, codfish and fruit. Sugar, on the other hand, shows a decrease of \$3,000,000; oil, \$2,800,000; and dry vegetables (beans, &c.), \$1,800,000.

The export of French manufactures has been highly satisfactory. Thus silks have risen from \$44,052,600 to \$54,664,000. Woollens have not varied; cotton goods fell from \$10,516,600 to \$10,128,000. Dressed skins are represented by \$25,720,400, an increase of \$400,000. The export of refined sugar has increased \$2,400,000, being thus far this year \$22,970,982. Woollen yarn has increased from \$4,169,600 to \$6,258,000. Straw hats have risen to \$4,056,000, against \$3,400,000 last year. The import of manufactures shows an increase of \$600,000 in cotton goods, \$800,000 in twist and \$400,000 in machinery, while woollens have fallen from \$12,125,400 to \$11,747,000.

Taking a general view of French trade we find that the importation of food has increased in a striking manner, on account of short crops and the influx of visitors to Paris. If France has paid more money than usual for food, there is an offset in the enormous amount of money spent by foreigners flocking to the Exhibition, estimated by some competent authorities at no less than \$200,000,000. It may indeed be safely asserted that the Paris Exhibition has been the means of preventing hard times in France this year.

Returning to England, we find that that country has done about as large an export trade during the period named as it did last year, though at considerably reduced values, but the import of food has greatly increased under the combined influence of deficient crops and materially lower prices. On the other hand, the import of most articles classified under raw material yet to be worked into manufactures, shows a great decline, also chiefly due to their remarkable depreciation.

Comprehensively considered, these English statistics exhibit nothing which shows that England is any worse off than France or the other nations of Europe, and there is nothing particularly ominous in the figures. Yet we all know that England is in the midst of an industrial, and to some extent a financial, crisis, manifesting itself there more clearly than anywhere else. The labor troubles, time reductions, complaints, bank and other failures prove it. Hence we are carried to the conclusion that these English troubles lie deeper than mere trade statistics can show. The English cotton and iron industries, for example, are known to be rotten to the core, more from unprofitableness than from a want of outlet. But even this outlet is for the most part not a healthy, natural one, for it consists to a considerable

extent, at least so far as dry goods and hardware are concerned, of continued consignments or sales on long credit, and this has been the case for many years past. This was a good and comparatively safe business as long as the countries shipped to were prosperous, and as long as the goods thus shipped gradually advanced in value and did not encounter a competition rendering their profitable sale a matter of great uncertainty. The reverse is true when values are declining, some consuming nations bankrupt and competition sharp—all of which is now the case.

Looking at cotton goods alone, we find that the number of yards shipped from England year after year is remarkably uniform, and that at present England ships \$260,000,000 worth where we ship \$10,000,000, but with this difference, that the portion we ship is all paid for in cash ere it leaves the country, while the bulk of that shipped from England is either bought on credit by the shipper or the consignee, or is consigned outright to await a sale. In other words, the enormous business England does with remote countries is to a considerable extent a forced one, and there are periods when a forced business rests upon everybody engaged in trade. Stocks of remnants accumulate the world over, depreciate in value, and some, being subject to fashion and caprice, become in many instances absolutely unsaleable. Yet Great Britain's remote customers send out fresh orders to keep up their assortment, and her exporters go on trusting them until a local bank failure saps their financial basis. They are forced into failure and liquidation, and their foreign debts are found to be very doubtful assets. It is chiefly on account of these extensive business relations existing at Glasgow, Manchester, Dundee, Birmingham and in other cities of Great Britain, that the recent failures assume a threatening aspect, and it is to be wondered at that more failures of large manufacturing and mercantile concerns have not occurred.

The French are less enterprising and more cautious, and their export of manufactures is safer, while their profits are on the average greater. The Germans are more enterprising than the French, but they are not as strong financially as either the French or the English, hence they are unable to trust large amounts of money at great distances. We are even less able than the Germans to extend liberal credits to remote customers, and nearly all the goods leaving our ports are paid for; or if we do trust we only give credit to people we can reach in a few days, like the planters and merchants of Cuba. At all events we have the satisfaction of knowing that, like the French, our basis for an export trade is a pretty safe one, and likely to remain so for many years to come.

Recent Advances in the Metallurgy of Iron and Steel.

It has been the subject of some comment among metallurgists that the recent Exhibition at Paris offered to criticism little that was absolutely new, a fact accounted for by the publicity which the patent laws give to inventions and to the vigilance and enterprise of technical journals. Nevertheless the Exhibition has marked an epoch in the history of the metallurgy of iron and steel, and has called out several valuable essays by eminent experts from which much in regard to what has been accomplished and what is the drift of prospective development, may be learned. Prof. Akerman has read a paper before the Iron and Steel Institute, in which he embodied his observations, and now Dr. Wedding, the well-known German metallurgist, has placed on record in the *Verhandlungen d. Vereins zur*

Beförderung d. Gewerbyl. what he considers a summary of recent progress. He does not look upon the question of the removal of phosphorus or its counteraction as settled satisfactorily. He states that Krupp's method of dephosphorizing by means of the well-known reaction of oxide of iron upon silicon and phosphorus, has come into practical use in an extensive manner in Germany. Bell's method is pronounced the greatest stride since the invention of the Bessemer process and the Siemens regenerator. The only thing which now remains to be done is the elimination of the phosphorus without the removal of silicon. He attaches importance to Du Puy's process, and deems the production of high grade ferromanganese a matter of no difficulty with the use of a sufficient amount of limestone as a flux. Since the adoption of chemical means for the production of solid steel castings, that problem may be considered solved. He cites the following analyses of some special products used in this connection: Wolf-ram, 24.25; manganese, 41.50; and iron, 30.00; chrome, 25.30; manganese, 13.20, and iron, 57.43. It is now possible to make the most complicated castings, which by reheating are released from internal strains; so that there seems to be some danger that the product of this new industry may seriously encroach upon the domain of malleable iron castings. True castings are often hardened and then annealed to a certain degree. In the Bessemer process the method of using the pig direct from the blast furnace seems to be gaining ground. The utilization of the heat of the gases issuing from the converter for heating the cupola blast according to Cooper's system, promises advantages in cases where the working is uninterrupted. It has been believed by many that the steel made by modern methods cannot be welded, but this has been entirely disproved by numerous exhibitors at Paris, notably by the Austrian State Railway and the Mariae and Railway Works of France.

Metallurgical Notes.

THE STEEL WORKS AT GIVORS.

The steel works at Givors, Rhône, France, one of the five large groups of works constituting the property of the Société des Forges et Acieries de la Marine et des Chemins de Fer, as its full title is, possess exceptional interest because fuel is used only at the first stage of the series of operations, viz., in the blast furnace; that is to say, Bessemer ingots are produced and prepared for the forge without other expenditure of fuel than the coke consumed in the blast furnaces. According to *Engineering*, the converters are worked with metal run from the blast furnace, and the waste gases of the latter furnish all the steam required, both for the blast furnace and Bessemer blowing engines, as well as the ingot cranes and other machines connected with the converter, in addition to heating the blast up to 1100° F. in Cowper's stoves. At the same time the consumption of coke has been reduced 35 per cent. as compared with the amount required before the adoption of superheated blast. This economy seems to have been realized mainly by the adoption of stoves and boilers having very large heating surfaces, and blowing engines working with a high degree of expansion. The boilers are of the plain double-cylinder shape, each formed of two tubes 47 feet long, the upper one 4 feet 3 inches and the lower 3 feet 3 inches in diameter, which are connected at five points. The gas, which is ignited in a large combustion chamber with numerous air channels, heats the lower half of the upper tube and passes completely round the lower one; the distance traveled by the flame to the chimney is 88 feet, and the temperature of the chimney 280 degrees. Each boiler has a heating surface of 810 square feet, and under ordinary working conditions produces from 3½ to 4 pounds of steam at 4½ atmospheres per foot of surface per hour, two being sufficient to drive the blast en-

gines at the speed necessary for burning from 100 to 110 tons of coke per diem in the blast furnaces, which corresponds to a duty of about 260-horse power. The two Bessemer blast engines are about 380-horse power. The hot-blast stoves are 19 feet in diameter, 52 feet 8 inches high and about 14,500 cubic feet capacity. They contain 450 tons of bricks, giving a total heating surface of about 26,000 square feet. With two blast furnaces and two Bessemer converters, from 30,000 to 32,000 tons of gray pig metal and 24,000 tons of steel—ingots—are produced annually without the consumption of an ounce of fuel beyond the coke used in smelting the ore.

A NEW PROCESS OF WORKING NICKEL ORES.

It will be remembered that some years ago the nickel industry in France received a great impetus by the discovery in New Caledonia, by Mr. Jules Garnier, of large deposits of a new nickel mineral called, after him, Garnierite. The working of this ore, essentially a hydrosilicate of nickel and magnesia, introduced a new element into the metallurgy of nickel which it will be profitable to trace, although the methods proposed are not directly applicable in this country. Mr. Garnier has just obtained a patent for what seems to be the latest stage of the development of this new branch of metallurgy. In order to eliminate the bulk of the iron in the ore Mr. Garnier passes the ore through a shaft furnace, adding, whenever the material is silicious, a percentage of lime. The height of the furnace adopted finally was about 25 feet, the blast, heated to about 750° F., being blown through one or more tuyeres. The consumption of fuel has ranged from 40 to 50 per cent. of the charge. Pure manganese ores are added as a flux, in order to have about 1 to 2 per cent. in the slag. The product of this process he has named "carburetted nickel," although, perhaps, nickel pig would be more appropriate. Its average composition is: Nickel, 60.90; iron, 32.35; silicon, 6.85; carbon, 3.40; sulphur, 1.50. This material is used either for the production of a pure nickel or of nickel-copper alloys. The former is made by refining the "carburetted nickel" in a reverberatory furnace heated by the Siemens or Ponsard system, holding from 4000 to 6000 lbs. Toward the end of this oxidizing process a nickel rabble is used, in order to avoid the introduction of impurities into the bath. Before casting, one to two per cent. of an alloy of nickel and manganese are added. He proposes to divide the refining process into two parts—first to eliminate the impurities until only 2 per cent. remains, then to cast and finally to finish the operation on a special hearth. We are not aware whether Mr. Garnier is still working at his works at Septême, near Marseilles, in view of the fact that for some time all operations have been suspended in New Caledonia in consequence of serious troubles with the natives.

COMPARISON OF GERMAN, SCOTCH AND ENGLISH FOUNDRY PIG.

A series of valuable articles has been written by Mr. Wachler, of Gleiwitz, Germany, for *Glaser's Ann. für Gewerbe-u. Bauwesen*, in which the writer comes to the conclusion that the furnaces of the Rhenish Provinces and Westphalia are well able, on account of the purity of their ores, coal and fluxes to produce as superior a foundry pig as Scotland; but even if existing conditions are fully taken advantage of it will be impossible to compete, for many years to come, with English or Scotch producers, because in Germany the distances over which the raw materials must be carried are great, and the cost of transportation is high. On the other hand, Scotch iron masters possess ore and fuel in close proximity, have good men, large capital, ample means of transportation and ready access to the sea. The cost price of Rhenish foundry pig No. 1 is on the average 60.06 marks per metric ton; the following being the items: Ore, 27.95; coke, 14.30; limestone, 4.30; coal, 0.41; wages, 6.70; materials, 4.10; repairs, 0.45; general, 1.85. The closest economy and most careful management, Mr. Wachler states, will not permit these figures to be reduced, so that German foundry pig manufacturers cannot think of competing with English makers nor with Scotch iron, with the exception perhaps of the brands Coltness and Langloan.

Therefore aid from the government is required, either in the shape of a duty or by means of the opening of new markets. The closing of the American market has forced English iron masters to seek an outlet elsewhere, and as good a customer as the United States was not quickly found; overproduction forced prices down, a decline which all countries not protected by a tariff had to follow. It is argued that a limitation of production in Germany would do no good because it was not Germany that suffered from overproduction.

THE ACTION OF HOT BLAST.

In his excellent translation, or rather elaboration, of Percy's "Metallurgy," Dr. Wedding admirably sums up his theory of the causes which contribute to the beneficial effects of hot blast on the working of blast furnaces, based upon a critical examination of the views expressed on this subject by Percy, Buff and Pfort, Scheerer, Schinz, Tunner and others: 1. An increase in the temperature of the blast increases the amount of carbonic acid and decreases the amount of carbonic oxide generated in the first combustion, approaching the temperature of the furnace to that which can be produced by the complete combustion of carbon to carbonic oxide. 2. The temperature thus arrived at is made more intense by the increased previous heating of the coal and the increased pressure in the hearth, and perhaps also by the considerable increase in the action of radiated heat. 3. In consequence of the heightened intensity of the temperature, which is brought about by causes outside of the furnace, a corresponding saving in fuel is effected, which is greater than the amount of fuel which may possibly be used for heating the blast. 4. The relative production—that is, the amount of materials smelted when compared to the fuel used—increases because the same amount of materials can be put through with a smaller quantity of fuel, or because greater amounts of materials can be smelted using the same amount of fuel when compared to working with cold blast. 5. The absolute production—that is, the amount of materials smelted in a given time—becomes greater, because combustion has been accelerated, and therefore the working of the furnace has become more rapid.

NEW PUBLICATIONS.

PALLISER'S MODEL HOMES, showing a variety of designs for model dwellings, &c. Palliser, Palliser & Co., architects, Bridgeport, Conn.

Messrs. Palliser & Co. are well known in connection with the several books published by them on architecture, intended to popularize good designs and show the public that nice effects and convenient arrangement are not incompatible with economy. In the work before us we have a number of good examples of cottages of pleasing design, costing from \$1500 to \$4500; also a barn, various outbuildings, a church, a school house, a town hall, &c. There are several chapters devoted to the discussion, from the architect's standpoint, of various questions of interest to our readers. The only quarrel which the reader will be likely to have with the author will grow out of the figures representing the cost of the buildings shown. We have no doubt they are correctly stated, but it will not always be found possible to get bids from responsible builders on an equally favorable basis. Cost, however, is a matter for the owner to determine for himself. What a house built to a given plan will cost is likely to depend very much upon what the owner can afford to spend for it.

The Birmingham Chamber of Commerce has sent out circulars on the subject of a uniform gauge for metal and wire. The Chambers addressed have had no difficulty in resolving that it is desirable but there still seems to remain some uncertainty as to what is to be accepted as the final standard.

M. Leon Chotteau has again been delegated to America in the interest of the Franco-American commercial treaty. He will embark at Havre on the 4th inst. It is expected that the treaty will be submitted to the two governments about July next.

AMERICAN SCREW CO.,

Providence, R. I.,

MANUFACTURERS OF MORE THAN 4000 VARIETIES OF PRODUCT,

AND INCREASING THE ASSORTMENT DAILY.

Machinery employed contains important inventions recently patented, and which are designed to produce Screws at a lower cost to the consumer than has ever been attained.

All goods are distributed through the Hardware trade, to whom a liberal discount will be allowed.

INTERNATIONAL EXHIBITION.

(No. 235.)

PHILADELPHIA, 1876.

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons, and decreed an award in conformity therewith.

PHILADELPHIA, November 8, 1876.

REPORT ON AWARDS.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz: Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.

G. L. REED, Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz,
Jas. Bain,
Chas. Staples,

G. L. Reed,
J. D. Imboden,

J. Diffenbach,
Dav. McHardy.

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards.
Given by authority of the United States Centennial Commission.

[L.S.] J. L. CAMPBELL, Secretary.

A. T. GOSHORN, Director-General.
J. R. HAWLEY, President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

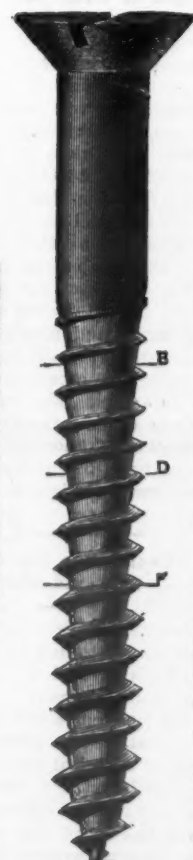
The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

Experience has shown that the wear point of screws, as formerly made, is at the heel of the thread, where all



Section at Line A B

Section at Line C D

Section at Line E F

Section at Line A B

Section at Line C D

Section at Line E F

the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

Estimated to be FIFTY PER CENT. stronger than a Screw as Commonly made.

ANNUAL REVIEW OF THE Manufacturing and Iron Industries of Eastern Pennsylvania.

Office of The Iron Age, 220 South Fourth St.,
PHILADELPHIA, Dec. 30, 1878.

In presenting a review of the Iron interests and its branches in Eastern Pennsylvania, we have classified the various departments so that our remarks may be understood in their proper connection. Of the magnitude of these interests some idea may be formed from the fact that nearly 30,000 men are employed as iron workers in this immediate vicinity. For the extreme courtesy with which our inquiries have been met and for the valuable information furnished, we now tender our sincere thanks, and at the same time wish to one and all a happy and prosperous new year.

We have been impressed with a few general features which appear to be common to all branches of business, with one or two trifling exceptions. First, that there has been greater depression in 1878 up to about the 1st of September than at any time since the panic of 1873. Second, that prices have been gradually declining and are now lower than ever before. Third, that the idea of an important advance in values is not held by those who are regarded as the most experienced men. Their views are based on the ground of the increased purchasing power of money, or in other words, the readjustment of values consequent upon a return to specie payments. Another fact appears to be that capital has earned very little during the year, and in no degree proportioned to the risks of business. If the opinion that prices are to remain almost stationary is correct, there seems to be but one alternative by which to induce the investment of capital, viz., to cheapen production. This has been accomplished during the year under review to a greater extent than is generally supposed, in some cases by reduction in wages, in others by improved processes, and by new machinery. We have very specific information upon this point. To give details, however, would be manifestly unfair to the parties interested. We may state, however, that in certain staples in some of the branches under review necessity has been the mother of invention, and by the aid of machinery goods are now being turned out with a small margin of profit to the manufacturer at prices which a year ago would have been deemed scarcely possible. At the same time it may be said that lower prices are regarded as entirely out of the question. A correspondent, in an exceedingly interesting letter, writes as follows: "During the past three months there has been a greater demand than in 1877, with less persistent demands from buyers for lower prices. It seems evident that in my line of goods prices have declined to their utmost limit, and may be said to be very close to absolute cost in establishments equipped with the most perfect machinery and appliances." In regard to the business outlook the same correspondent says: "I anticipate that before midsummer of 1879 is upon us we shall all be surprised at the increasing demand for goods of reliable manufacture. I have been for several months, and am now, hard at work getting ready for the coming business."

The Export Trade.

There has been much misapprehension in regard to foreign trade. We have therefore made special efforts to obtain correct information upon the subject, and the views now presented have been derived from parties of undoubted standing and large experience. In many branches American manufactures have been successfully introduced into the leading markets of the world, with every indication that they will maintain the position they now hold. Among these may be mentioned locomotives, sugar machinery, certain kinds of machine tools, agricultural implements of all descriptions, saws, edge tools and hardware specialties. It is not to be understood that every manufacturer of these articles can find a profitable foreign market, as many appear to think they can, by simply shipping goods to be sold for what they will bring. On the contrary, only a very few firms have been successful in securing a recognition, and then only by adapting their goods to the requirements of the market sought for, and by large expenditure of time and money. By way of illustration, having reference to this vicinity only, Baldwin Locomotives are now known the world over; sugar and other heavy machinery by such firms as James Moore, I. P. Morris Co., and machine tools by Wm. Sellers & Co. and W. B. Bement & Son; agricultural machinery by A. B. Farquhar; saws by Diston's; forks by Sheble & Fisher, are equally well known and have a recognized position, but it is a great mistake to suppose that other manufacturers in the same line as any of the above can at once find an equally favorable market. Neither should it be understood that there is no room for enterprise outside of a few leading firms. There are others in a less prominent way of business, covering nearly every department, who have sold more or less goods for export, and those having specialties of real merit will also secure recognition in due time. The objection is in the method of seeking to obtain business, and for this class these remarks are specially intended. The risks and expenses connected with foreign business are too great to warrant its being sought for except by firms with large capital and who make this branch a specialty. Consigning goods through irresponsible parties, in anticipation of large returns, has proved a delusion and a snare. In many cases goods so consigned have not only been entirely lost, but have been offered in competition with the same articles legitimately exported, thus killing the goose that laid the golden eggs. Some good firms have attempted to sell direct, but lower prices had to be accepted than to the home trade, while remittances were never received in less than four or six months, and frequently twice that length of time. In many cases vexatious claims have been

made, while if the parties do not choose to pay there is but little chance of getting anything by compulsion. The growth of the foreign trade, therefore, will most likely be through established channels, rather than by indiscriminate shipments through parties of whom little is known to others of whom absolutely nothing is known. Referring to the export trade the correspondent previously mentioned says: "As to foreign trade, it has on the threshold discouraging features which might have been anticipated, but it has also encouraging features. It will not pay for every manufacturer to chase after a foreign market; the most of us must be content with home trade; but for those who make good articles at the lowest possible cost, to seek a foreign market is commendable, and I believe in the end they will find their profit in it. Government is helping through its consular and other agents abroad, but I think should help to establish and maintain for a time steam communication with all foreign countries wherever a remunerative trade might after a time be reasonably expected." Another correspondent writes: "We do very little in foreign trade, and think there are so many bunnies and sharpers endeavoring to victimize the public, that many are disgusted with efforts in that direction." Still another says: "Foreign trade is yet in its infancy. There are too many trying to do an export commission business, and not enough who have knowledge and capital in the regular export trade. This throws the risk solely upon the manufacturer, who ought to bear only a part of the burden."

Iron Ships.

Business during 1878 has been fairly active, showing in the early part of the year a tendency toward improvement which, however, for the time being is not sustained. The total tonnage of iron vessels launched on the Delaware during the year may be placed at about 25,000 tons, and the value at about \$5,000,000. At the works of John Roach & Son, Chester, Pa., the following steamships have been completed:

Oregon, registered tonnage.....	3,335
City of Rio de Janeiro, registered tonnage.....	3,548
City of Para, registered tonnage.....	3,532
Saratoga,.....	2,426
City of Columbus, registered tonnage.....	1,992
Gate City, registered tonnage.....	1,997
Juan Mir,.....	423

and two ships now on the stocks not yet named, one about 2450 tons and another 2850 tons.

At Wilmington, Del., something has been done in river steamers and tugs, but we have not been able to obtain details. A leading firm there writes us that "relating to work turned out, we are sorry to have to advise you that we have nothing worth reporting." In Philadelphia business has been unusually active, largely, however, on account of work on steamships sold to the Russian government. Wm. Cramp & Sons have employed from 1500 to 2000 men during a large portion of the year, and have launched two first-class steamships and one smaller steamer. The work of overhauling and refitting the California and the Columbus has, however, been almost equal to building new vessels. Neafie & Levy have done a large amount of work, as follows: A tug-boat, 60 x 14 x 6.6 feet, with high-pressure engine, 14 x 16 inches; a tow-boat, 100 x 21 feet, with low-pressure jet condensing engine, 26 x 26 inches, for the New York and New Haven Railroad Company; a steamship, 211 x 32.6 x 21.6 feet, double deck, with low-pressure, surface condensing compound engine, 30 inches diameter high-pressure cylinder, 50 inches low-pressure, and 36 inches stroke, schooner rigged, with two masts, for freight and passengers for the Havana coasting trade. They have also on the stocks a tow-boat, 80 x 17 x 9 feet, with high-pressure engine, 24 x 22 inches, not yet named, for use at the jetties at New Orleans. They have also built a wooden vessel, 160 x 27 x 9.6 feet, with surface condensing engine, 30 x 34 inches; the machinery for a ferry-boat for Baltimore, 34 inches by 9 feet; for a freight boat, 18 x 18 inches; for the steamship Morro Castle, altered from a side-wheel to a propeller ship, engine, 50 x 60 inches, and have just closed the contract for a new wooden steamer, 163 x 24 x 15 feet, with surface condensing engine, 24 x 24 inches. There are also one or two other small establishments, but the amount of work done is not important.

Chains.

In this connection we may refer to this trade, associated as it is with shipbuilding. Bradley & Co. of this city, who claim to make the heaviest chains in this country, report as follows: "The volume of the chain business has been about the same as last year. Prices have been considerably lower and margins almost imperceptible." This firm have just completed a marine railway chain of 2 1/4 O iron, 350 feet long, for Charleston, S. C.; also have just completed a large order for the Lighthouse Department at Charleston of 2 1/2 stud chain; have also furnished the chain for the Russian vessels at Cramp's, and for the vessels built at Chester, and are now working on chains for the new iron vessels building at Neafie & Levy's. Also made 800 feet 2 1/4 marine railway chain, and 400 feet 2 1/4 ditto, and 125 feet 3 1/4 chain, which is the largest chain yet manufactured in the United States.

Bolts, Rivets, &c.

In this line we find an average increase of from 10 to 15 per cent. in weight as compared with 1877. The usual complaint of low prices is no exception among manufacturers of these goods. It is thought that bottom has been reached, however, and 1879, it is anticipated, will be a good year. Some foreign trade is being done, but it is found difficult to compete with the low prices of European goods.

Locomotives.

Business during the year has shown quite an improvement; actual statistics indicate an increase of over 60 per cent. as compared with the preceding year, the output at the Baldwin Works being 135 locomotives in 1877, against something more than 300 during 1878. Forty of these, however, on Russian account, may be regarded as exceptional. Another portion of the increase is due to orders from the elevated railways, and to some extent, also, to the introduction of street motors. Making due allowance for these, however, a clear gain of 35 to 40

per cent. has been established in ordinary business as compared with the previous year, while a large portion of the increase has been obtained during the last six months. The Baldwin Works, in course of the current year, have received orders and made shipments of locomotives to Brazil, Peru, Cuba, Nicaragua, Russia, Norway, Italy, Australia and New Zealand, with results that seem to indicate the establishment of a permanent trade with all these countries. Within the past week an order has been received from Brazil for six narrow gauge locomotives, and the outlook generally is regarded as fairly encouraging. Prices have had a shrinkage of fully 50 per cent. during the past five years. Locomotives which cost \$10,000 in 1873 can now be bought for \$5000. Cost of production has decreased largely, but not in proportion to selling prices. The company have just shipped to the far West what is probably the most powerful locomotive ever built, its capacity being estimated at 2500 tons on a level. For the time being street motors seem to have lost their popularity, although we notice in the Baldwin Works one being built for a street railway in Dunedin, New Zealand, and another for Brooklyn, New York. The low price of horses and horse feed, as well as an indisposition during these stringent times to make any changes involving outlay, is the chief cause of apathy in regard to street motors, but they are a demonstrated success, and will no doubt eventually be brought into general use. Average number of men employed upward of 1500. The firm have just received by cable an order for nine of the largest size locomotives, showing the opening of business in a field of great importance.

Car Building.

This industry is one of great importance, and in Wilmington, Del., Philadelphia, Harrisburg and York, Pa., upward of 4000 hands in good times are directly engaged in the car shops. At present 2000 to 2500 would probably be a more correct estimate. The position of the trade and the character of the communications are such, however, that details are not considered advisable. The demand for passenger cars has not been large, although important progress has been made in securing recognition in foreign markets, and there is no doubt that a permanent and increasing business will be maintained.

In freight cars there has been a large amount of work given out, and with one or two exceptions a considerable increase of business is reported as compared with the previous year. The foreign demand is steadily increasing, and in some cases large establishments have work of this class sufficient to occupy them for weeks to come.

Car Wheels.

This branch of business is developing new fields, and notwithstanding the fact that one or two railway companies are making their own wheels, about an average number have been sent out by firms engaged solely in their manufacture. A. Whitney & Sons have had some of their chilled cast-iron wheels, 38 inches diameter, under test in England by the Great Eastern Railway Co. since February, so far with completely successful results. We are informed that the American wheels have not hitherto been able to find a market in England on account of prejudice against the use of cast iron for that purpose, but the prospects now seem to be more favorable. American wheels are sold largely for street-car and similar purposes, and prospects for foreign trade are considered encouraging.

Steel Tires.

A largely increased business has been done, as compared with 1877, and prospects for the ensuing year are said to be quite cheering. The Standard Steel Works have increased their output over 50 per cent. as compared with the previous year. We have no official information from the Midvale Steel Works, but they are understood to be full of work and to have made a large advance on the output of 1877.

Scales and Testing Machines.

Riehle Bros. report that they made more scales during 1878 than during any one year for some time back, and more testing machines than in any one previous year. The outlook is considered good for both branches of business, especially for railroads and iron works, who are beginning to renew their scales, &c. A large number of railroad scales have been put in during the year. In testing machines may be mentioned one of 150 tons capacity for Bradley & Co., one of 100 tons for the C. B. and Q. Railway Company, and others. One also has been ordered by Dr. C. W. Siemens to go to England; another by Capt. W. B. Eads for New Orleans. They have a fair amount of work on hand, and prospects of an increased business next year.

Heavy Machinery.

Intimately connected with railway interests are firms engaged in the manufacture of machine tools. Wm. Sellers & Co., W. B. Bement & Son, Harrington & Son, and Ferris & Miles may be regarded as representative firms in this line. Details, for obvious reasons, are not easily accessible. That considerable improvement has been realized during the year past is beyond doubt. Compared with equal date of last year the outlook is admitted to be very encouraging, while the amount of work done shows a steady increase. Foreign trade is gradually developing, the orders secured some time ago from Australia alone by Wm. Sellers & Co. being estimated at over \$50,000. In another branch, such as sugar machinery, mining machinery, cotton presses, rolling mill equipments, &c., a steady increase of business is reported. James Moore, the I. P. Morris Company, the Reading Iron Company (the two last named especially) and others report a considerable improvement during the year, with still better prospects in the immediate future. In

Light Machinery

and special tools, such as lathes, valve seat planers, cylinder boring machines, &c., a decided improvement is noticed. Israel H. Johnson, Jr., & Co. supplied the engineers' department of the Russian steamships with lathes, and other tools of the same character have been sent to distant countries. The L. B. Flanders Machine Works have had orders for their special tools from South America and the Pacific coast, besides a considerable amount of local work. In

Steam Engines

business has been far from satisfactory. Robert Wetherill & Co., of Chester, Pa., and Chas. W. Ervian & Co., of Jacob Naylor & Co., and Campbell & Rickards, of Philadelphia, make almost identical reports, viz., that business has fallen off compared with 1877, and prices too low to leave any margin for profit. Buyers of late have been more than usually prepared to pay cash down, and have therefore bought very close. Among the larger engines built during the year may be named those at the Girard College, by Wetherill; Eagle Mills, Manayunk, by Ervian; Midvale Steel Works (extra heavy and strong for 12-roll train), by Naylor; and N. & G. Taylor Co., by Campbell & Rickards. The last named have also built two steam hoisting cranes, each to lift 30 gross tons, for McNeals & Archer, Burlington, N. J. As an indication of the shrinkage in values, we have been informed by one of the above firms that steam engines selling for \$1200 three or four years ago now only bring about \$700. Prospects of increased business are encouraging, as inquiries are numerous and from a good class of buyers. Charles W. Ervian & Co. have orders on hand for several steam engines for mining purposes in California, and have recently shipped five of this class to San Francisco. In small power engines quite a number of sales have been made on foreign account. Lovegrove & Co. report sales of this class of engines during the year for shipment to Australia, India, Cuba, South America, and inquiries from Russia and other parts of Europe.

Elevators.

Stokes & Parrish, who make this class of work a leading specialty, report an increase of business equal to about 50 per cent. as compared with 1877. They have employed more hands, but the principal increase has been derived from improved facilities in manufacturing. They have built a large number of elevators during the year for hotels, warehouses, &c., in New York, Baltimore and Philadelphia; also hydraulic elevator for the Glamorgan Iron Works, six hoists for the Standard Oil Company and two double drum hoists for the government for the Washington monument.

Shafting, Pulleys, &c.

This class of trade is of large dimensions in Philadelphia, and is chiefly in the hands of such firms as Wm. Sellers & Co., Thos. Wood, Geo. V. Cresson, Yocum & Son and one or two others. The report in this branch denotes a decided improvement, probably 25 per cent. as compared with 1877. The outlook is also said to be encouraging, although prices are very low. The export trade shows steady growth.

Bolting

Philadelphia holds a prominent position in this class of trade also, and the products of the leading firms are distributed in all parts of the Union, and to some extent in foreign markets. Business during the year shows some falling off as compared with 1877, but during the past three months there have been encouraging signs of improvement. Since 1873 prices have declined 20 per cent. and during the past year about 5 per cent. It is believed that bottom has been reached, and a larger business at better prices is expected during 1879.

Agricultural Machinery and Implements.

This branch of trade is one in which it may be fairly claimed that the United States leads the whole world. In Pennsylvania there are a few representative manufacturers, such as A. B. Farquhar, of York. In a brief synopsis of the year's business, Mr. Farquhar writes us that "the increase in bulk has been 50 per cent., and in value about 33 1/2 per cent., giving employment to about 25 per cent. more hands than in 1877. Prices declining and profits small." Sheble & Fisher and Myers & Ervian, the well-known manufacturers of forks, &c., make a very similar report. Their export trade is increasing, but prices are low and leave very little margin for profit.

Hardware.

The firms engaged in the manufacture of such goods as are sold by hardware merchants, employ in this vicinity upward of 4000 men, Henry Diston & Sons leading with 1000. Reading Hardware Co., Enterprise Manufacturing Co., Carr, Crawley & Devlin, B. Rowland & Co., Welsh & Lea and American Machine Co. also each employ a large force. There are other firms employing from 10 to 50 hands each, making a total, as above stated, of about 4000 men. In specialties controlled by such firms as the Enterprise Manufacturing Co., the American Machine Co. and others, business shows steady growth. In builders' hardware and heavy goods generally prices have been cut extremely low, and manufacturers claim that profits have been out of all proportion to the capital invested. The number of hands employed in these branches has been about 10 per cent. greater than in 1877. Foreign trade has steadily increased, with excellent prospects of its continuance. Some firms report an increase of 50 per cent. in their foreign trade.

Saws.

We have no special details in regard to the saw trade, but we understand that it shows a fair average increase. The yellow fever for a time cut off a considerable amount of business in the Southwest, but in other directions there has been a steady increase, particularly in long saws.

Files.

An important increase is reported in the amount of goods turned out, but prices have been too low to leave any reasonable margin of profit for the manufacturers. Orders for files have been received from nearly every country in Europe, as well as the British colonies and South America. Whatever the condition of business may be elsewhere, the Philadelphia file trade has certainly made a rapid advance during 1878.

Shovels.

There has been about an average business during the year, but prices have been unsatisfactory. Ordinary goods seemed to be forced on the market without regard to profit, and the outlook in this respect is not specially encouraging. Some of the manufacturers report an increase of business, particularly in the case of specialties, which in a measure being free from competition,

command a reasonable price. The export trade is increasing, but as a rule manufacturers deal with parties on the spot, selling at low figures in preference to taking risks at a distance.

Edge Tools, Hammers, &c.

There is nothing calling for special comment. The general report seems to be that more business has been done than in 1877, but at slightly lower prices. The average increase of business during the year may be estimated at nearly 20 per cent. weight. The past three months has shown the most rapid increase, and prospects for 1879 are considered good. Not much increase in the export trade.

Locks.

In door locks a fair average business has been done, but without any feature calling for special remark. Some foreign trade has been developed which will be carefully followed up. In padlocks we get much the same report, although one firm informs us that their business in Scandinavians has been 50 per cent. larger than in 1877. Another firm says: "We have largely increased our facilities for manufacturing, and hope to do three times as much in 1879 as we did in 1877. We find a steady, dull market, averaging, perhaps, no improvement, and, if anything, less active now than three months since." In trunk locks we learn that a full average business has been done during the year, and a large export trade to Europe is done chiefly with Germany.

Cutlery.

The demand has been good the year through, with an increased production of about 15 per cent., with sales fully in proportion. The outlook for 1879 is considered satisfactory, with the usual exception that prices are unremunerative. No foreign trade.

Carriage Bolts, Screws, &c.

On the whole, a larger business has been done in carriage bolts than for some years past. The trade is not by any means what it ought to be, however, as prices leave little or no margin for profit. Competition has been very close, and in the anxiety for business prices have been cut down until there is very little left for the manufacturer. At some portions of the year orders came in rapidly, and the works were pushed to their utmost capacity; at other times business was dull and dragging, making on the whole a large output with only a very moderate return for the capital invested. Sales of bolts for export show a steady increase. In screws the Philadelphia Screw Co. inform us that they have made a large advance in the amount of business done as compared with 1877. Their screws are specially adapted for carriage and car building, and will no doubt command an increasing sale in these as in other departments.

Steel.

The demand during the year has been good, particularly during the last three months. Prices have been lower, however, but are now thought to have reached bottom. As in other departments, there has been a good deal of unhealthy competition, and it is thought the "weeding-out process" is not yet thoroughly exhausted. It is understood that stocks in jobbers' hands are light, and with a solid foundation as regards prices the coming year is expected to be fairly prosperous.

Ornamental Iron Work.

Business shows an improvement as compared with 1877, more hands employed and more goods sold, particularly during the latter part of the year. Some foreign trade has been done. E. G. Smyser, of York, Pa., have sent some very handsome work to Wales and other places in Great Britain. Good work commands attention abroad, and will likely lead to a steady export demand. Inquiries have also been received by J. B. Wickersham from parties in England for his American portable hurdle fence.

Foundry Facings, Crucibles, &c.

J. W. Paxson & Co. report the amount of business done during the year as slightly greater than in 1877, but the fall in prices has more than counterbalanced it. The general foundry business seems to be in better condition than it was a year ago, hence a better demand is anticipated for foundry facings. In crucibles the exports by Wile, Siedel & Co., mentioned some time ago, appear to have met with approval, further orders from Europe having been received within the past few days. They also report some improvement in their general trade.

Stoves.

Business has not been at all what was anticipated; in some cases a smaller amount of business is reported than in former years, and in all cases prices have been most unsatisfactory. Up to a few days ago the weather has been unusually mild, which may perhaps to some extent explain the inactivity. Sales have been on shorter terms of credit than usual, and collections so far have been very fair.

Tin Plates.

We find, by examination of the Liverpool list of exports for the first eleven months of 1878, that Philadelphia is steadily increasing her trade. In 1872 the exports to the United States during the first eleven months of the year were 1,304,646 boxes, of which Philadelphia received 98,837 boxes, say 7 1/2 per cent. During the same period in 1878 the exports were 1,523,498 boxes, of which Philadelphia received 288,205 boxes, equal to about 18 per cent. It will be seen, therefore, that while the total imports of tin plates to the United States have only increased about 18 per cent., the imports to Philadelphia have increased over 200 per cent. This increase has been of steady growth—1876 alone showing a slight falling off. The total per cent. of increase from 1875 to 1878 being 48 per cent.

Building.

Total number of building permits: For 1876, 5380; 1877, 6273; 1878, 4269.

Pig Iron.

During eleven months of the year the tendency of the market has been steadily downward, and only within the past few weeks has there been any change. The suspension of the Allentown Iron Company seemed to arrest the decline, since which the market has been steady and at times firm. The average decline during the year may

placed at about \$1.50 per ton, although occasional transactions have been noticed showing \$2.50 to \$3 below the lowest figure of 1877. These were exceptional, however, and only in the case of lots forced on the market to realize cash. During December the market has been free from obstructions of this character and transactions usually at about quoted rates. Business has been confined to small lots however, and it is yet to be seen how the market will bear up without the support of large buyers. There is a disposition to increase production somewhat, based upon anticipations of larger demand, but consumers show no anxiety in regard to the future, and appear quite willing to take their chances of the market. In several instances purchases have been made with deliveries extending up to May, and in one or two cases we know of transactions covering all 1879, all based on prices current at this date. From these contracts it may be inferred that prices are not likely to vary much either one way or the other. As to the cost of Pig Iron we are indebted to Mr. W. E. S. Baker for the figures now furnished on page 15, from which it appears that \$16.88 at furnace bank is about the average cost per ton at this date. A careful examination of these figures show that in 1850-1-2 and 3 Pig Iron was produced at an average cost during the four years of \$15.30 per ton. The next period of low prices was in 1860-1-2 and 3, when the average for four years was \$17.85. The average cost for 14 years, say from 1850 to 1863, is shown to be \$17.50 per ton. A careful analysis of these figures will be found at this time very suggestive. Coal seems to be the item showing the greatest discrepancy, and at the present low price is \$1.64 to the ton of Iron dearer than the average of the 14 years from 1850 to 1863. With the return to specie payments a general marking down in values is looked for, and if everything else shrinks to ante-war prices why not coal? A reduction in coal to the average of the price for the 14 years, as above shown, would reduce the cost of Pig Iron to \$15.24, about the same cost as the average previous to the war. There are very few men of experience in the trade who predict much advance in prices, and there not a few who think we have not yet seen the lowest, and there is no doubt efforts toward cheapening cost will have to be made in the direction indicated. There is another serious disadvantage which Eastern ironmasters have to meet, viz., that of freights. We have not been able to obtain the exact figures, but we have been informed on good authority that there has been no change in local rates for years past, while freights to distant points have been cut down all the way from 30 to 60 %. Whatever shrinkage there has been in freights has not been to the advantage of the Eastern Iron trade, but the reverse. As shown in another column, all kinds of railway equipments are now supplied at greatly reduced prices—locomotives, 50 %. Rails show a still greater decline, as also all kinds of tools and machinery, and the ironmasters seem to have just cause for complaint in the matter of freights. Stocks on hand are believed to be somewhat lighter than at equal date in 1877, but there are several large blocks on hand which the trade would like to see absorbed. These are supposed to be in strong hands, however, and not likely to come on the market unless something unforeseen occurs. A larger volume of business is anticipated during the coming year, and it is hoped with more satisfactory results to producers than in the past two years.

Structural Iron.

The year just closed has been one of great activity, and the leading firms engaged in this department have been almost continuously employed up to their fullest capacity. The Phoenix Iron Company, the Pencoyd and others have made a large advance in the output of their product as compared with 1876 and 1877. Actual figures are difficult to obtain, but we have been informed by one of the firms named that their product during the first eleven months of 1878 was 3000 tons greater than during the whole of 1877. A safe estimate of the average increase of business in special shapes would probably be from 25 % to 35 %. The consumption of raw material by this class of trade has been a strong support to the Iron market, and it is encouraging to note that the outlook denotes a continued active demand. The construction of the Elevated Railroad in New York has absorbed upward of 30,000 tons of Iron to date, while some of the mills have still enough work on hand to employ them during the next three or four months. Bridge building and ship building has caused a large demand, as also to some extent for architectural purposes. Prices have not been satisfactory, however, and it is said that an immense amount of work has been done with scarcely any margin for profit. Prices have varied considerably, according to circumstances. Angles and Tees are probably \$2 to \$5 per ton lower than they were a year ago, but Beams are without change, a 2000-ton order having been placed during the current month at about \$2.47 1/2 at mill, same price having been accepted a year ago for a similar lot. At the moment there is but little inquiry, and parties are complaining of dullness, but after the holidays it is expected that business will take a new start.

Plate Iron.

The year now closing has on the whole been an improvement on 1877. A large amount of Plates have been consumed during the year, and at times sellers have been pushed to their utmost to make deliveries on time. Prices have been unsatisfactory, however, and manufacturers claim to have been sometimes compelled to accept orders at bare cost in order to keep their mills running. The lowest prices seem to have prevailed during the summer months, and were fully \$5 per ton below anything accepted during 1877. Toward the close of the year prices stiffened up somewhat and were quoted \$2 to \$3 higher, but there is very little demand and the market is weak and irregular. A dull time seems inevitable during the next month or two, and there is little doubt (unremunerative as prices are said to be) manufacturers will be quite willing to accept orders for the present at same prices as current during 1878. A comparison

of quotations, based on sales made a year ago, with those of to-day, show a decline of about \$2 to \$3 on average lots.

Sheet Iron.

A large amount of business has been done during the year, and the mills, as a rule, kept busy to their full capacity. This, however, has not prevented a decline in prices, although there are evidences which seem to show that rock-bottom has at last been reached. The last half the year developed a large trade, but it seemed impossible to obtain any advance in prices, although manufacturers firmly refused any concessions further than had been made during the early part of the year. Stocks have been reduced to an unusually low point, and the trade may be said to be in a fairly healthy condition. A comparison of prices with those current a year ago shows an average decline of about \$3 per ton, more in some descriptions and less in others. A consideration of the past season's business, after stock-taking, &c., will no doubt determine the course of the market during the next few months.

Bar Iron.

Business during the year has been very much depressed, and prices most unsatisfactory. Western manufacturers seem to have special advantages in the way of low freights, while Eastern manufacturers find the rates prohibitory so soon as they attempt to reach Western markets. It is a matter of frequent occurrence for surplus stocks to be thrown on the seaboard markets irrespective of cost; hence a competition which it is difficult to meet under ordinary circumstances. The local mills have been at a further disadvantage owing to the abandonment of classification, and prices have therefore been very irregular and unremunerative. During the summer a reduction of wages was demanded by the employers, which after a nine weeks' strike the men were glad to accept. The position of the manufacturers has not been improved, however; indeed, complaints are as numerous as before that it is impossible to realize anything over first cost at prices usually obtained. There has been a much better demand during the past few weeks, and it is thought an increased consumption may be expected during the coming year. At present there is not much chance of an advance in prices, although it is hoped something may be done to prevent continued cutting in extras. The decline during the year has been about \$3 per ton on Best Refined Iron. Common is quoted same as a year ago, say \$34 @ \$35 per ton.

Steel Rails.

The Steel trade on the whole has been entirely satisfactory, the advance during the first six months of the year being about \$4 per ton. The rate quoted in the early part of January was \$40 per ton, and in July \$44. Prices were well sustained until about October, when the demand began to slacken, and under a gradually weakening market quotations settled down to about \$42, with a few sales at \$41, and in one or two cases still lower figures were accepted. The retrograde movement in prices is not the result of a falling off in the demand, but owing more particularly to the character of the orders, which have been chiefly for large lots, for such deliveries and terms as make them specially desirable. During the past two months it is estimated that nearly 200,000 tons have been placed, and it is understood that the mills now have an average of four months' work on hand, which may be expected not only to prevent any decline but rather to advance prices, as in the past year. Most of the mills are asking higher prices already, and there is but little probability of sales being repeated at the low rates accepted two or three weeks ago.

Iron Rails.

Taking the year through some little improvement may be noticed, both as regards prices obtained and quantity of Rails manufactured. During the early part of the year prices ruled very low, and sales at mill were made at \$30, and in one or two cases even lower prices were accepted. With higher figures for Old Rails and a more active demand generally, prices have been gradually stiffened, until \$32 became a minimum figure, and for good Rails \$33 @ \$34. During the past three months orders have come in very freely, and the mills have been steadily employed, it is supposed at a small margin of profit. A reference to our review of business of 1877 shows a remarkable uniformity with that of 1878, the lowest and highest prices having been precisely the same in both years. The low prices, however, in 1877 were toward the close of the year, while in 1878 the lowest prices were in the early part, and the highest toward the close of the year. From the present standpoint it would seem as though the lowest point of depression was passed several months ago. The outlook is also more satisfactory than a year ago, most of the mills having work on hand to last some time, while the prospects of good orders at an early date are quite encouraging. The demand for light Rails on Cuban account has been continuous, and with a settled condition of affairs in that country an increasing business is anticipated. There is also a probability of a large order from the Southwest being on the market in course of a few weeks, so that on the whole it may be safely asserted that the Iron Rail trade is in a healthy condition.

Old Rails.

The course of the market during 1878 has been very similar to that of the previous year. In 1877 the market opened at \$21, declined steadily until prices reached \$19 in July, and from that figure were held steadily until \$20 was reached in December. In 1878 the market opened firm at \$20, gradually weakened again until July, when they were sold as low as \$18. During the next three months they again advanced until \$20.50 was reached in October, and at about that price have been steadily held until the present date, with \$20 as the lowest quotation named to-day. Comparing the price of Old Rails with Forge Iron, we find, in December, 1875, a difference per ton in favor of Old Rails of \$2.50; in 1876, \$2; in 1877, \$3, and in 1878, \$5. It is difficult to predict what the course of the market will be during the coming year, although from present indications prices are likely to be

held steady. A good many Old Rails will no doubt come on the market in spring, but they seem to be in such constant demand as to prevent much accumulation except very temporarily. It is also understood that Steel Rails have been so generally used within the past few years that the quantity of Iron Rails to be taken up will be reduced to such an extent as to materially affect values. Much will depend, however, upon prices in other departments of the Iron trade, but it is likely the margin of \$5 between Old Rails and Forge Iron will be fully maintained.

Mining and Mineral Items.

COAL.

The Dell Roy Coal and Coke Company, of Cleveland, Ohio, was incorporated Saturday, the 21st ult., by Charles B. Stuart and others, with a capital of \$100,000.

The coal works of D. B. Ashbaugh, at Leechburg, Pa., are running full time, giving the men steady work at 50 cents per ton.

The Sippo Coal Company, located at Massillon, Ohio, with \$40,000 capital, was incorporated at Columbus last Wednesday week. Clement Russell, John E. McLain, John G. Warwick, Kent J. Chase and Milton Wilson are the incorporators.

The Uniontown (Pa.) Standard says: Frick & Co., of Broadford, have about concluded the purchase of Sherrick & Markle's coke works at \$50,000, and are also negotiating for the works of Boyle & Hazlett, Mt. Pleasant. This same firm, Frick & Co., leased the coke works of W. D. Mullen, and took possession on December 1. They now control over 1000 ovens. The Ferguson works, belonging to same firm, have been undergoing repairs, and some of the ovens are already fired.

During the month of November there were shipped from Straitsville 4170 cars of coal, of which the Straitsville Central Mining Company shipped 1957 cars, or daily average of 40 1/2 cars; by the Straitsville Coal Company, 1049, or an average of 40 cars per day; by the Consolidated Mining Company, 807, or a daily average of 33 cars; by J. S. Doe & Co., 422 cars, an average of 16 cars; Patterson Coal Company, 390 cars, average 15 cars; Kinkaid, Mitchell & Co., 344 cars, average 13; J. H. Tucker, Straitsville, 101 cars, average 4 cars.

The mines at Lonsaconing, Md., are nearly all shut down for the winter.

COPPER.

The Houghton Mining Gazette publishes the following relative to this year's copper production in the Lake Superior district: The last shipment of copper was made on the 24th ult., which cleaned up the production of our mines for about the past twelve months. The yield of copper on the lake for the year ending with the above date is a few hundred tons in excess of the corresponding time last year. The notable increase is in the case of the Calumet and Hecla, which afforded in the neighborhood of 1600 tons more mineral. The Franklin yield is about 200 tons greater. From what information we have at hand now, the yield of the Atlantic, Quincy, Osceola, Allouez, Central and Pewabic mines will be nearly the same as last year. The Phoenix yield is some what less. Ontonagon county has probably held its own.

PRECIOUS METALS.

Dividends last month have made a better showing. California surprised its friends on Monday, the 16th, by coming out with \$540,000. Standard has declared \$50,000, Bodie \$50,000, Eureka Consolidated \$150,000, and Golden Star, a new Arizona property, \$25,000—a total of \$815,000. The California dividend is regarded rather in the light of a Christmas present to the stockholders than a permanent resumption. The mine last month hardly produced the amount of the dividend, to say nothing of expenses. The Silver King of Arizona, about which so much has been written in praise, paid no dividend last month, nor has any yet been declared this month.

New discoveries of rich silver deposits continue in the vicinity of Leadville. Among the latest and most remarkable is one made by Lieutenant Governor Tobar, on Saturday morning, the 7th ult., of a sand carbonate vein, from which \$5700 were taken that day, and the discovery of very rich deposits on the Ten-Mile Creek, where a fissure vein 17 feet thick is reported. By an examination of the D. & G. Railway books for November, it appears that nearly 2,000,000 pounds of base bullion were transported from Leadville by that route in November, and upwards of twice that quantity of high grade silver ore. The shipments from Colorado Springs alone in November of base silver bullion were 1,025,000 pounds. It is evident the product in silver of the Leadville mines will very largely exceed any estimates heretofore published.

The Philadelphia Inquirer prints an account of an interview with President Gowen, of the Philadelphia and Reading Railroad Company, in which Mr. Gowen says that he accepts the result of last week's meeting as an indication that there will be no combination made for next year. He does not, however, think this need visit disaster upon the coal trade of Pennsylvania. While admitting that his company would doubtless make more money next year with the combination than without it, he believes it will do a heavy business at fair prices; and that, if others will follow the example of selling all the coal they can at the best prices obtainable, there will be little cause for dissatisfaction. He says his company is about to enjoy an advantage it has not heretofore had in a winter outlet for coal to the harbor of New York, which will be furnished through connection with the Bound Brook and New Jersey Central roads. He further says his company may also be enabled to run over the Camden and Amboy road, in which event it is probable that the company will have the largest winter coal traffic it ever had. The prospect is, therefore, quite encouraging.

The glass-chimney factory of Plunkett, Ihmsen & Co., Southside, Pittsburgh, has shut down until after the holidays.

ESTABLISHED 1849.

INCORPORATED 1876.

BRADSTREET'S

IMPROVED

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THE BRADSTREET COMPANY,

Proprietors.

Principal Office, 279, 281 and 283 Broadway, New York.

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VOLUMES ISSUED QUARTERLY.

Sheets of Changes Semi-Weekly.

CONSTANT REVISIONS AND PROMPT NOTIFICATIONS TO SUBSCRIBERS.

To Merchants, Manufacturers and Bankers:

We shall issue the *Forty-fourth* volume of our *Reports* during the first weeks of January. We submit this edition with confidence, as it has been revised with unusual care and great expense. We are determined to spare no effort to make our work complete, comprehensive and reliable; and to this end we have perfected many improvements which will appear in the January volume, but which have never heretofore appeared in any Commercial Reports. In consequence of the repeal of the Bankrupt Act, we have compiled an abstract of the Collection Laws of the several States which we print under the proper headings. The compilation of these laws has been made by representative attorneys in each State, and may be relied upon. We believe this feature will be appreciated by all who have occasion to grant credits covering different sections of the country. Inasmuch as our books are published quarterly, we shall be able in future to give any amendments to these laws, down to the very latest date.

We have also introduced under each town or village head concise information, showing its actual or relative position—whether on a railroad, steamboat, or stage route—the population, and whether a telegraph, express, or money-order office, and if without a bank or banker, the nearest place where collections may be sent. As a Shipping, as well as Collection Guide, this will be almost invaluable, it being more comprehensive, and we intend that it shall be more reliable than any published otherwise. We have also tabulated the Banks and Bankers throughout the United States and Canada, giving their capital, &c., as well as their New York correspondent, which we publish as an appendix to each volume, retaining, however, the names as they appear at present under their respective town or city in the regular volume.

These improvements are but an index of what we intend to do for our patrons in the future. Owning and directing our whole business, from London to San Francisco, as from Montreal to New Orleans, we are able to control it in all its branches, so that it is not possible for the interests of our patrons to suffer from conflict with local managers.

Relying solely on the merits of our work, we respectfully solicit an examination of our system, with the assurance of our ability to substantiate all we claim, and with the knowledge that it is worthy of your earnest consideration.

CHARLES F. CLARK, President.

B. KREISCHER & SONS, FIRE BRICK AND CLAY RETORT WORKS.

Established 1845.

Office, foot of Houston Street, East River,
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The largest stock of Fire Brick of all shapes and sizes on hand and made to order at short notice.
Cupola Brick, for McKensie Patent, and others. Fire Mortar, Ground Brick, Clay and Sand. Superior Kaolin for Rolling Mills and foundries. Stone Ware and other Fire Clay and Sand, from my own mines at New Jersey and Staten Island, by the cargo or otherwise.

NEWTON & CO.,

Successor to

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ALBANY, N. Y., Manufacturers of

FIRE BRICK

Stove Linings,

Range and Heater Linings

Cylinder Brick, &c., &c.

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Manufacturers of

FIRE BRICK And Furnace Blocks

DRAIN PIPE & LAND TILE.

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ESTABLISHED 1846.

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of reliable quality for all purposes, manufactured on the best New Jersey Fire Clays. Also, Architecture Terra Cotta, Fire Clay, Fire Sand, Kaolin, Ground Fire Brick and Diamantine Building Brick.

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Manufacturers of Clay Retorts, Fire Bricks, Ga House and other Tile, Cupola Brick, &c. Dealers in and Miners of Fire Clay and Fire Sand. Clay bank at Burt's Creek, New Jersey. Manufacture: Van Dyke, Elizabeth, Richards and Partition Sts., Brooklyn, N. Y. Office No. 51 Van Dyke St.

Watson Fire Brick Manufactory

ESTABLISHED 1836.

JOHN R. WATSON, Perth Amboy, New Jersey.

Manufacturer of

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For Rolling Mills, Blast Furnaces, Foundries, Gas Works, Lime Kilns, Tanneries, Boiler and Grate Setting, Glass Works, &c.
FINE CLAYS, FIRE SAND, AND KAOLIN FOR SALE.

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Proprietor of the

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Fire Brick, Tile & Furnace Blocks,
OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings,
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Miners and Shippers of Fire Clay.
Office: 375 Penn Ave., Pittsburgh, Pa.
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Manufacturers of

Fire Bricks,
Clay Gas Retorts,
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Eighteen years' practical experience.
CYRUS BORGNER. WM. J. O'BRIEN

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MANUFACTURER OF

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Cotton, Freight and Hay Hooks,
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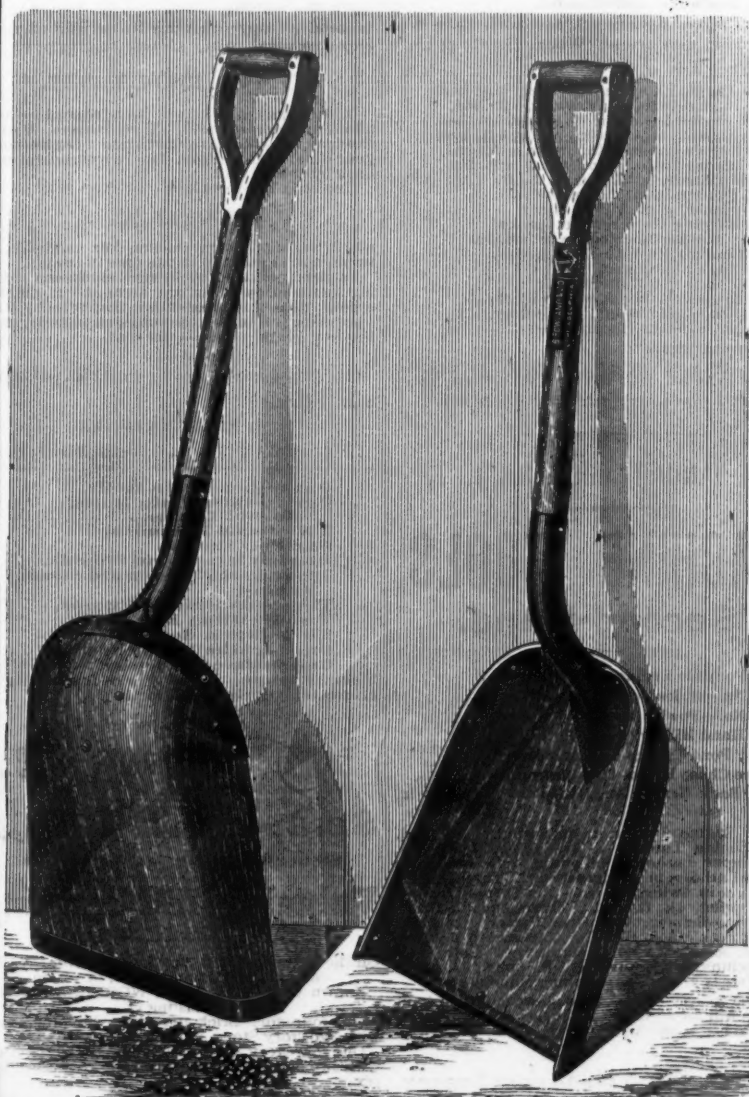
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B. Rowland & Co.'s Patent Wooden Blade Grain and Potato Scoop.

We would call the attention of the trade to the above new article of our manufacture, and to its many advantages over the Steel Blade Scoop heretofore used for the same purpose, advantages which we think are destined to make it of universal use for the shoveling of grains of all descriptions, as well as for potatoes, apples, etc.: First, as to its weight, which is a little more than one-half that of a steel scoop of the same capacity, consequently it can be handled more rapidly and accomplish more work in a given time; second, as to its appearance—it is more slightly, being of a graceful shape, and constant use has the effect of giving the wood a beautiful hard polish, causing it to penetrate the mass of grain readily and deliver its load promptly. It balances perfectly in the hands, is thoroughly braced and guarded with iron at all exposed points, and is fully as strong and in some respects more durable than the steel scoop used for the same purpose. One trial will insure its future use to the exclusion of all others.

B. Rowland & Co. CAST STEEL.

All goods of this brand (which is copyrighted) are warranted in every respect.

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NEW YORK WAREHOUSE, 100 Chambers St.

INDUSTRIAL ITEMS.

VERMONT.

At a late special meeting of the stockholders of the St. Albans Iron and Steel Works, W. C. Smith, F. S. Stranahan, C. W. Rich, H. R. James and Cyrus Bishop were appointed a committee with full power to endeavor to relieve the company of its present embarrassment; to negotiate a loan, by mortgage of property or otherwise, to pay the debt of the company, or to sell the property, as they may deem best.

MASSACHUSETTS.

The E. Stebbings Manufacturing Company, of Springfield, which has recently been reorganized and put upon an enduring foundation with President Geo. C. Fisk, of the Wason Manufacturing Company at its head, was founded in 1843, and, after the burning of the old works, formed a new corporation and erected its present buildings some three years ago. The outlay at that time contemplated growth in the amount of work in all departments. The foundry is now finished and is a model one. The establishment produces all kinds of brass goods and makes a specialty of the finest brass and composition castings. Work is done for Colt's armory, the New Haven Arms Company and the United States Government. H. M. Brewster, for the last seven years connected with Hayden, Gere & Co., of Haydenville, has taken the agency of the company.

The Richmond Iron Works, West Stockbridge, Berkshire county, have set a number of their choppers at work, getting ready to burn charcoal this winter in considerable quantity, and the furnace is to be started next spring.

The Fall River Iron Works have contracts for two months ahead, which afford work for 500 men. The nail works have a capacity of 120,000 kegs per annum, and 104 kinds of nails are made.

The Knowles Steam Pump Works of Warren have a large contract with Salt Lake City parties to furnish two huge pumps for emptying silver mines. One pump is to have a 44-inch steam cylinder and a pumping capacity of 3,000,000 gallons daily, while the second will be larger yet. As the first machine must be ready in six weeks, extra machinists are to be hired and the shops run day and night.

NEW YORK.

The Troy mills have been troubled with high water during the recent storms, causing partial stoppage at some of them.

The Syracuse Chilled Plow Company are building new works to enlarge their capacity. They turn out 50 plows daily at present, which they will increase to 150 in their new works. The process of treating their iron is not divulged.

R. H. Arnold, of Honesaga, has invented an adjustable spindle attachment for broken axle-trees, by means of which a broken axle-tree can be repaired in a few minutes. It is said to be a simple, practical and useful device.

PENNSYLVANIA.

Logan, Eagle, Milesburg and Howard are all the furnaces now in blast in Center county.

The capacity of the Reading Bolt and Nut Works of J. H. Sternbergh is being increased by the introduction of some new machines, which will be used for the manufacture of cold-punched nuts and boiler and tank rivets, a new line of goods. Heretofore the articles manufactured at this place embraced only hot-pressed nuts, lag screws and machine bolts. He is also building the new machinery, some of which is nearly finished. At present 80 hands are employed, and after the completion of the new machinery more hands will be engaged. The buildings were enlarged a few years ago with a view to the introduction of the new machinery, and there is ample room for the increase in machinery without any enlargement now of the buildings. Goods manufactured at the Reading Bolt and Nut Works are shipped to all parts of the United States, Canada and South America.

The Pottstown Ledger says: The firm of Potts Bros., this borough, have received a large contract for the manufacture of iron for the new oil pipe line, to be put down from the oil regions to Williamsport, and for the tank cars to carry the oil from Williamsport, over the Philadelphia and Reading Railroad, to the seaboard. The order, we understand, comes from the Reading Iron Works, at Reading, and is to be executed immediately. Messrs. Potts Bros. will at once double their force of operatives, so as to run day and night, and the work will keep their mill running with a continuous hum for several months.

Blast was put on No. 5 stack of the Crane Iron Co. last week. Four stacks are now in operation.

The office of Kimberly, Carnes & Co., in Sharon, and that of the Etna Iron Co., in New Castle, have telephonic communication. The distance is 22 miles, and the telephone is pronounced a complete success.

The production of the furnace of the Millerstown Iron Co., at Macungie, amounted to 250 tons week before last.

Washington Furnace is the only furnace in Clinton county, and is owned by the Associated Land Co. of North America, parties living in England. It has been a fine property, but it has gone to decay very much.

PITTSBURGH AND VICINITY.

The Pittsburgh Forge and Iron Co.'s bar mill, guide mill and puddle mill, Allegheny, are all on double turn.

A. M. Byers & Co.'s lap-weld tube works—an addition to their plant—is nearly completed.

The refining of the second stack of the Shoenberger Furnaces is rapidly approaching completion, when it will be blown in.

The Pittsburgh Car Works, impelled by a rush of orders, began to run full time on Monday last. The works have been running only half time for several months.

It is rumored that an Eastern firm are negotiating for the old Fort Pitt Mill, Reese, Graff & Woods, with a view of starting the same at once.

Messrs. C. Coleman & Son, of Allegheny, are making 2000 railroad wheelbarrows to fill an order from South America. Klein,

Logan & Co., Pittsburgh, have also got an order for 6000 picks and shovels. The goods will be shipped by way of Baltimore.

The Apollo Rolling Mill is making sheet iron for tin plate. The Monitor Tin Plate and Galvanizing Company, of New York, have the contract for doing their tinning, and they have been able to produce an article equal to the imported, and altogether free from blisters. The Apollo Mill is running double turn with 200 hands employed, and is selling readily all its products.

We are informed that the managers of the Edgar Thomson Steel Works, after a careful examination of several stoves, have decided to adopt the Siemens-Cowper-Cochrane patent for their new furnace.

We have received from Messrs. Kier Bros., Pittsburgh, manufacturers of the "Salina" and "Summit Cut" brands of fire brick. The following analysis of their fire-brick, made by the Geological Survey of Pennsylvania. Sample of fire-clay from Armstrong county, collected by W. G. Platt at Salina Station, Westmoreland side of Kiskiminetas River, from property of Kier Bros.:

Silica.....	51.000
Alumina.....	31.600
Protoxide of iron.....	1.134
Titanic acid.....	1.100
Lime.....	.030
Magnesia.....	.469
Alkalies.....	.408
Water, &c.....	13.400

Total.....100.599

Analysis of clays as made by Mr. S. S. Hart in the laboratory of the second geological survey of Pennsylvania:

Silica.....	55.350	47.250	40.750	60.350
Alumina.....	27.841	34.350	37.350	21.070
Protoxide of iron.....	2.916	.093	2.448	1.650
Lime.....	.580	.580	.580	.918
Magnesia.....	.750	.090	.008	trace
Alkalies.....	3.016	.261	.570	.218
Titanic Acid.....	1.140	1.990	2.280	1.200
Carbonic acid.....	.453	.453	.408	.775
Water and organic matter.....	7.495	13.695	15.008	9.395

Total.....100.429 99.364 99.230 99.608

- 1.—Plastic clay.
- 2.—Top stratum.
- 3.—Stratum 6 feet from bottom.
- 4.—Bottom stratum.

This analysis shows a very good article of clay and fully justifies the favor in which these bricks are held. They are used largely in blast furnaces, rolling mills, steel works, and especially in connection with the Siemens melting furnace and in glass works, and are giving entire satisfaction. The works are running to their fullest capacity.

A switch tower similar to that in operation on the Pennsylvania Railroad at East Liberty, is being constructed at the Edgar Thomson Steel Works, at Braddock, and will soon be completed. All the switches at the works will be operated from the tower, and will greatly expedite business. Signals similar to those used on the railroad will also be introduced. A new forge department is also being constructed at the works.

The steel smelters employed at the several steel works in the city are said to be forming a union, the object being a combined resistance to the demands of the manufacturers that they (the smelters) shall turn out what is known as a "long ton," or 2240 pounds, instead of the ordinary ton of 2000 pounds.

OHIO.

In the past two weeks Sarah Furnace made 365 tons of metal, stopping on Sundays too. This is an increased yield. Belfont Furnace made 286 tons the past week.—Ironton Register.

The Belfont Iron Works at Ironton are contemplating the erection of 20 more nail machines.

KENTUCKY.

The parties supplying the Ashland, Norton and Princess furnaces with limestone, receive 75¢ per ton delivered on the cars at the Ashland railroad depot, while before the panic the price was \$2.25. It is safe to average the yearly consumption of limestone at that place at 20,000 tons, which represents a decrease of \$30,000 per year in this one instance only.

Ashland furnace is making from 40 to 43 tons of A No. 1 Foundry iron per day. They are selling the iron as fast as it is made.

Mt. Savage, Hunnewell and Pennsylvania are now out of blast.

ALABAMA.

A statement to the effect that the Tecumseh Furnace made in October 566½ tons of pig metal is on its travels in the papers. The first two figures have become transposed. It should be 656½. This was made with an average consumption of 99.03 bushels of charcoal. The ore was brown hematite, yielding 55.427 per cent. of calcined ore. The furnace, which is 60x12, has been in blast 4½ months, on an Ohio fire-brick hearth.

MISSOURI.

The St. Louis Bridge Company have perfected their organization by electing Solon Humphreys, of New York, president; E. W. Woodward, of St. Louis, vice president; Ed. Walsh, Jr., of St. Louis, secretary; Anthony J. Thomas, of New York, treasurer. The bridge will pass into the hands of this company as soon as the legal forms are conformed to. The contract stipulates that the company will give to the holders of the first mortgage new bonds at par; to holders of the second mortgage will be issued first preferred stock; to holders of the third mortgage second preferred stock. The arrangement also contemplates the setting apart of the earnings of the bridge until 1881, to be divided between the first mortgage bondholders and the holders of indebtedness incurred while the property was in the hands of the receiver.

Capt. Eads, who has charge of the work on the jetties at New Orleans, writes as follows, under date of 21st inst.: To-day the steamship City of Limerick, drawing 23 feet on even keel, went through the jetties without the least trouble. Tide two-tenths below average flood tide. The City of Limerick is the largest and deepest draft vessel which has ever come to the port of New Orleans.

A boiler explosion on the 23d ult., at the Corning Iron Works, South Troy, N. Y., killed one man and injured several others. The damage to the mill is estimated at \$70,000.

Trade Report.

Office of THE IRON AGE,
TUESDAY EVENING, Dec. 31, 1878.

The closing week of the year is comparatively uneventful in financial circles. If the resumption of specie payments by the Treasury in the redemption of the only obligations which it has thus far dishonored is to be attended with any of the disasters which those opposed to a gold basis have predicted, we are certainly approaching ruin very quietly. So far we are from "universal bankruptcy," that the business community find cause for congratulation in the situation and the outlook. The period of annual settlements has led to very few failures; and there is reason to believe that nothing of an exciting or disturbing nature is imminent. Instead of looking forward to the redemption of the demand notes of the United States in coin as a calamity to be dreaded, specie payment is already an accomplished fact, so far as the domestic and foreign banks and the business public are concerned. The local money market is unprecedentedly easy for the season, and closes at 4 @ 5% to borrowers on call. The discount rate on prime mercantile paper is 4½ @ 6%.

The gold market has practically ceased to exist, except in a strictly commercial sense. There is no recognized difference between gold, treasury notes and national bank notes. There has been some demand for gold loans to fill contracts for delivery before the end of the year, and coin has been easily obtainable at 1-64 % per day.

Government bonds are strong and buoyant. Only the 67s are weak, on expectation of a call of \$15,000,000 for redemption, which is looked for on Thursday, January 2. We give below the closing quotations for governments.

The stock market is fairly strong, closing at the quotations given below.

The bank return shows an increase of \$73,675 in surplus reserve, which now stands at \$10,478,775, against \$7,994,950 at this time last year, and \$14,909,525 at the corresponding period in 1876. The loans show a decrease this week of \$149,700; the specie is decreased \$397,400; the legal tenders are increased \$1,167,100; the deposits are decreased \$415,900 and the circulation is down \$500,300.

The following is an analysis of the bank totals of this week compared with that of last week:

	Dec. 31.	Dec. 28.	Comparisons
Loans.....	\$95,974,100	\$95,824,200	Dec. \$149,700
Specie.....	\$9,511,500	\$9,908,900	Dec. \$397,400
Legal tenders	39,600,000	40,767,100	Inc. 1,167,100
Total reserve	60,511,500	61,381,200	Inc. 769,700
Deposits.....	203,525,600	203,941,500	Dec. \$415,900
Reserve re-quired.....	50,206,400	50,802,425	Dec. \$596,025
Surplus.....	9,605,100	10,478,775	Inc. \$873,675
Circulation.....	20,077,000	20,576,700	Dec. \$500,300

The following are the statistics of foreign trade for the week so far as obtainable at the hour of going to press:

	For week ended Dec. 28:	1878.	1877.	1876.
Total for week.....	\$4,035,572	\$4,454,733	\$5,504,356	\$5,504,356
Prev. reported.....	\$7,496,079	\$11,744,897	\$25,315,788	\$25,315,788

Included in the imports of general merchandise were articles valued as follows:

	Quantity.	Value.
Anvils.....	5,036	\$50,570
Brass goods.....	760	\$17,074
Bismuth.....	21	9,830
Bronzes.....	155,939	\$155,939
Chains and anchors.....	672	\$1,160
Copper.....	165,350	\$1,160
Cutlery.....	4,032	\$1,160
Gas fixtures.....	28	\$1,160
Guns.....	370,068	\$1,160
Hardware.....	45,374	\$1,160
Iron, pig, tons.....	8,451	\$1,160
Iron, sheet, tons.....	73,788	\$1,160
Iron ties.....	28,018	\$1,160
Iron tubes.....	2,665	\$1,160
Iron ore, tons.....	11,877	\$1,160
Iron, other, tons.....	37,254	\$1,160
Lead, pigs.....	30,330	\$1,160
Lead, sheets.....	6,338	\$1,160
Metals.....	609,959	\$1,160
Nails.....	29,508	\$1,160
Needles.....	343,329	\$1,160
Nickel.....	12,062	\$1,160
Old metal.....	45,408	\$1,160
Platina.....	180,485	\$1,160
Plated ware.....	38	\$1,160
Per. caps.....	140,201	\$1,160
Saddlery.....	46,235	\$1,160
Steel.....	44,305	\$1,160
Spelter.....	1,069,393	\$1,160
Silverware.....	21,195	\$1,160
Tin, bars.....	1,921,833	\$1,160
Tin, slabs, lbs.....	1,777	\$1,160
Tin, bbls.....	145	\$1,160
Wire.....	4,770	\$1,160
Zinc, lbs.....	805,602	\$1,160

The exports of domestic products for the week amounted to \$5,782,673.

For week ended Dec. 23:

	Total for the week.....	Previously reported.....
Total for week.....	\$5,000	\$5,000
Same time in 1877.....	\$23,332,012	\$23,332,012
Same time in 1876.....	\$25,470,339	\$25,470,339
Same time in 1875.....	\$43,549,476	\$43,549,476
Same time in 1874.....	\$70,820,094	\$70,820,094
Same time in 1873.....	\$9,511,770	\$9,511,770
Same time in 1872.....	\$48,059,661	\$48,059,661
Same time in 1871.....	\$71,959,043	\$71,959,043

Government bonds closed as follows:

	Bid.	Asked.
U. S. Currency 6's.....	119½	119½
U. S. 6's 1881 registered.....	106½	106½
U. S. 6's 1881 coupon.....	106½	106½
U. S. 6's 1882 reg.....	106½	106½
U. S. 6's 1882 coupon.....	106½	106½
U. S. 6's 1883 reg.....	106½	106½
U. S. 6's 1883 coupon.....	106½	106½
U. S. 10-40 reg.....	108½	108½
U. S. 10-40 coupon.....	108½	108½
U. S. 1's 1881 registered.....	107½	107½
U. S. 1's 1881 coupon.....	107½	107½
U. S. 4's 1881 registered.....	104½	104½
U. S. 4's 1881 coupon.....	104½	104½
U. S. 4's 1892 registered.....	99½	99½
U. S. 4's 1892 coupon.....	100½	100½

The following were the closing quotations of active shares:

	Bid.	Asked.
Atlantic and Pacific Telegraph.....	25½	25½
Chicago and Northwest.....	50½	50½
Chicago and St. Paul.....	50½	50½
Chicago, Rock Island and Pacific.....	119½	119½
Chicago, Bur. and Quincy.....	110½	110½
Col. Chicago and Ind. Central.....	57½	57½
Clev., Col., Cin. and Ind.....	34½	34½

Cleveland and Pittsburgh.....	33½	34
Chicago and Alton.....	70½	70½
Chicago and St. Paul.....	106	106
Canton.....	23	23
Delaware, Lack. and Western.....	102½	102½
Delaware and Hudson Canal.....	37½	37½
Express-Adams.....	103½	103½
" American.....	40½	40½
" United States.....	45	45
" Wells, Fargo & Co.....	25½	25½
Erie.....	22½	22½
" Pref.....	37½	37½
Harlem.....	141	141
Hannibal and St. Joseph.....	135½	135½
" Pref.....	34½	34½
Illinois Central.....	70½	70½
Kansas Pacific.....	9½	9½
Kansas and Texas.....	6	6
* Lake Shore.....	68½	68½
* Michigan Central.....	73½	73½
Morris and Essex.....	75½	75½
Milwaukee and St. Paul.....	36½	36½
New York Central.....	70½	70½
New Jersey Central.....	131½	131½
Ohio and Mississippi.....	7½	7½
" Pref.....	10½	10½
Pacific Mail.....	10½	10½
Pittsburgh and Fort Wayne.....	13½	13½
Quicksilver.....	11	11
" Pref.....	33	33
St. Louis and Iron Mountain.....	12½	12½
St. Louis Kansas City Northern.....	25½	25½
" Pref.....	3½	3½
St. Louis and San Francisco.....	3½	3½
" Pref.....	3½	3½
Sutro Tunnel.....	33½	33½
Union Pacific.....	60½	60½
Western Union Telegraph.....	95½	95½
Wabash.....	21½	21½

* Ex-dividend.

GENERAL HARDWARE.

There is little that is interesting in the way of news in Hardware circles this week, and we can only report a quiet state of affairs, such as is usual in the holiday season. We print below the changes in values that have transpired since our last writing.

Russell Jennings, Deep River, Conn., will quote his Extensive Lip Augers and Auger Bits at the following reduced prices on and after January 1, 1879: Auger, Dowel, Machine Dowel and Hand Rail Bits, discount 10 & 10 to 10 per cent. Carpenters' Augers, 16½ & 10 & 10 to 10 per cent. Car and Machine Bits, Boring Machine and Millwrights' Augers, 25 & 10 & 10 to 10 per cent.

The demand for Nails continues light and prices remain as previously quoted, viz.: \$2.10 @ \$2.15 net per keg for rod. to 6d.

The Russell & Erwin Mfg. Co. will issue, under date of Jan. 1, the following revised price list of Padlocks. The discount remains as before:

RUSSELL & ERWIN MFG. CO.			
Revised List Prices of Padlocks.			
Key.	Pr. dz.	Key.	Pr. dz.
5000.....	\$1.05	100.....	\$3.05
3000.....	1.50	110.....	4.00
2000.....	2.25	120.....	4.25
1000.....	2.00	130.....	4.50
1100.....	4.00	140.....	4.75
1200.....	4.25	150.....	5.00
1300.....	4.50	160.....	5.25
1400.....	4.75	170.....	5.50
1500.....	5.00	180.....	5.75
1600.....	5.25	190.....	6.00
1700.....	5.50	200.....	6.25
1800.....	5.75	210.....	6.50
1900.....	6.00	220.....	6.75
2000.....	6.25	230.....	7.00
2100.....	6.50	240.....	7.25
2200.....	6.75	250.....	7.50
2300.....	7.00	260.....	7.75
2400.....	7.25	270.....	8.00
2500.....	7.50	280.....	8.25
2600.....	7.75	290.....	8.50
2700.....	8.00	300.....	8.75
2800.....	8.25	310.....	9.00
2900.....	8.50	320.....	9.25
3000.....	8.75	330.....	9.50
3100.....	9.00	340.....	9.75
3200.....	9.25	350.....	10.00
3300.....	9.50	360.....	10.25
3400.....	9.75	370.....	10.50
3500.....	10.00	380.....	10.75
3600.....	10.25	390.....	11.00
3700.....	10.50	400.....	11.25
3800.....	10.75	410.....	11.50
3900.....	11.00	420.....	11.75
4000.....	11.25	430.....	12.00
4100.....	11.50	440.....	12.25
4200.....	11.75	450.....	12.50
4300.....	12.00	460.....	12.75
4400.....	12.25	470.....	13.00
4500.....	12.50	480.....	13.25
4600.....	12.75	490.....	13.50
4700.....	13.00	500.....	13.75
4800.....	13.25	510.....	14.00
4900.....	13.50	520.....	14.25
5000.....	13.75	530.....	14.50
5100.....	14.00	540.....	14.75
5200.....	14.25	550.....	15.00
5300.....	14.50	560.....	15.25
5400.....	14.75	570.....	15.50
5500.....	15.00	580.....	15.75
5600.....	15.25	590.....	16.00
5700.....	15.50	600.....	16.25
5800.....	15.75	610.....	16.50
5900.....	16.00	620.....	16.75
6000.....	16.25	630.....	17.00
6100.....	16.50	640.....	17.25
6200.....	16.75	650.....	17.50
6300.....	17.00	660.....	17.75
6400.....	17.25	670.....	18.00
6500.....	17.50	680.....	18.25
6600.....	17.75	690.....	18.50
6700.....	18.00	700.....	18.75
6800.....	18.25	710.....	19.00
6900.....	18.50	720.....	19.25
7000.....	18.75	730.....	19.50
7100.....	19.00	740.....	19.75
7200.....	19.25	750.....	20.00
7300.....	19.50	760.....	20.25
7400.....	19.75	770.....	20.50
7500.....	20.00	780.....	20.75
7600.....	20.25	790.....	21.00
7700.....	20.50	800.....	21.25
7800.....	20.75	810.....	21.50
7900.....	21.00	820.....	21.75
8000.....	21.25	830.....	22.00
8100.....	21.50	840.....	22.25
8200.....	21.75	850.....	22.50
8300.....	22.00	860.....	22.75
8400.....	22.25	870.....	23.00
8500.....	22.50	880.....	23.25
8600.....	22.75	890.....	23.50
8700.....	23.00	900.....	23.75
8800.....	23.25	910.....	24.00
8900.....	23.50	920.....	24.25
9000.....	23.75	930.....	24.50
9100.....	24.00	940.....	24.75
9200.....	24.25	950.....	25.00
9300.....	24.50	960.....	25.25
9400.....	24.75	970.....	25.50
9500.....	25.00	980.....	25.75
9600.....	25.25	990.....	26.00
9700.....	25.50	1000.....	26.25
9800.....	25.75		
9900.....	26.00		
10000.....	26.25		

Steel Padlock Keys, Nickel Plated.

	Per gross.
No. 410, 411, 420, 421, 510.....	\$7.50
No. 1000, 1001.....	7.50
No. 1102.....	7.50
No. 1200, 1201.....	8.00
No. 1202.....	10.00
No. 1203.....	12.00
No. 1205, 1206, 1210.....	12.00
No. 1209, 1212, 1209, 1218, 1219.....	12.00
No. 1213, 1213.....	18.00
No. 1214, 1215, 1216, 1217.....	9.00
No. 1220, 1221.....	12.00
No. 1250, 1251, 1252.....	9.00

Malleable Iron Rods & Bars

In view of the fact that the Lehigh Valley operators steadily refused to continue the combination upon the last year's basis, or form a new one unless a larger tonnage was given to them or a new basis agreed upon, the ending of the combination had practically been discounted, and the recent auction sale of 100,000 tons showed very nearly the temper of the buyers. Dealers generally throughout New York city and in many portions of the country have closed the year with as light stocks as they could safely have and carry on their business. The quantity of domestic coal laid in has apparently been somewhat light. The consequence of this is that the cold weather has, in spite of the ending of the combination, brought a very fair business, especially in all the domestic sizes. These sizes are in fact scarce, and we hear that some of the smaller operators have sold themselves short on the month's delivery. The prices are in general from 10¢ to 25¢ per ton in advance of the auction sale, but in most cases the printed quotations are shaded from 5¢ to 15¢, according to circumstances. Steam Coals are not in as active demand, and prices are not as stiff. The cold weather, high winds in the harbor, and the rapid closing of the Hudson, all have had a tendency to stiffen prices for the moment. The coal men in the city, although very anxious about a future combination, have apparently very little to complain of in the way of trade for the next 30 days, especially if the cold weather lasts. So long as the market retains its present features there is little probability that a combination will be formed, for it appears that each company will have about all it can do to attend to filling its own orders. Outside of the Lehigh dealers it is very curious to see how firmly convinced coal merchants are of the absolute necessity the Lehigh people have for a combination, and how much more benefit will accrue to them from joining a new combination than going on without one. The trade talk as though it was a settled fact that the Lehigh people are already very sick of the fight for tonnage and were ready to get back to the fold of a combination. We do not, upon the closest inquiry, find any trace of this feeling, however. The fact of the case seems to be that the Lehigh people are very ready to go on and take the market as they find it, believing that there is a regular demand for a certain amount of their coal, no matter what quantity of the other coals is mined. The actual question of a combination, however, is not at all likely to come up for the present.

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending Dec. 29, 1878:

Hardware.	Iron.
Baker Hermann & Co. Cutlery, ca. 12 Per caps, ca. 4 Blumenthal A. & S. Cases, 2 Fales Thos. S. Guns, ca. 1 Folsom H. & D. Guns, ca. 4 Hildick A. H. Anvils, 70 Hoe R. & Co. Cases, 2 Hodgkins & Haigh. Guns, ca. 1 McCoy & Co. Cases, 4 Hoes, ca. 7 Moore's John P. Sons. Guns, ca. 3 Mose, plgs., 6 Mason John W. & Co. Wire rope, coils, 15 Planque de E. Cases, 2 Fin, Forward & Co. Cases, 10 Rodgers' Cutlery Co. Cases, 1 Ranf Richard. Ironware, ca. 9 Strasburger Pfeiffer Co. Cases, 2 Schuyler, Hartley & Graham. Cases, 2 Guns, ca. 2 Schuyler & Daly. Mds., 100	Hussey, Howe & Co. Swedish bars, 639 Mason W. D. & Co. Ore, tons, 40 Moore's John P. Sons. Bars, bbls., 120 Pheps, Dodge & Co. Sheet, bbls., 43 Order. Sheet, bbls., 177 Spiegel, tons, 332 Pig, tons, 100
Steel.	Metals.
Merrick C. S. Cases, 4 Bars, 12 Bundies, 77 Prosser Thos. & Son. Tire forgings, 5 Bars, 4 Scott Thos. Bundies, 30 Saxton & Son. Cases, 8 Sanderson G. & Co. Bundies, 17 Woodford W. O. Tin plates, 294 Bars, 1 Order. Bundies, 38 Bars, 11 Cases, 27 Cases, 14	Bruce & Cook. Black plates, 50 Cort N. L. & Co. Tin plates, bxs., 1137 Hoadley & Co. Scrap metal, bales, 2 Meyer Moritz. Lead, bars, 636 Naylor & Son. Tin plates, bxs., 1827 Pheps, Dodge & Co. Tin plates, bxs., 2107 Scheider Jos. & Co. Tin plates, bxs., 316 Wessels G. Scrap metals, lbs., 3178 Scrap cop. lbs., 1237 Bars, 10 Copper pumps, 4 Order. Tin plates, 1589 Terns plgs., 1335 Tin, slabs, 602

OLD METALS, PAPER STOCK, &c.

The market for Old Metals, Paper Stock, Rags and other junk materials has continued without any special feature of interest during the past week. Business is very quiet and prices remain nominally unchanged.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy.....	per lb. \$0.1	@
Copper Bottoms.....	10 1/2	@
Yellow Metal.....	10	@
Brass, heavy.....	10 1/2	@
Brass, light.....	10	@
Composition, heavy.....	11 1/2	@
Lead solid.....	10 1/2	@
Tin Lead.....	10 1/2	@
Zinc.....	10 1/2	@
Pewter, No. 1.....	10	@
Pewter, No. 2.....	10	@
Wrought Iron.....	per ton \$16.00	@
Light Plate.....	9.00	@
Store Plate.....	11.00	@
Machinery do.....	11.00	@
Grate Bars.....	3.00	@

The prices current for Rags, &c., are as follows:

Canvas, Lines.....	per lb. 3 c.	@ 3 1/2 c.
Cotton, No. 1.....	3 1/2 c.	@
White, No. 2.....	3 1/2 c.	@ 3 1/2 c.
No. 3.....	3 c.	@
Seconda.....	2 1/2 c.	@
Mixed, Woolen.....	2 c.	@ 3 c.
Soft, do.....	1 1/2 c.	@ 7 c.
Gunny bagging.....	2 1/2 c.	@
Juste bottle.....	3 c.	@
Kentucky bagging.....	3 c.	@

Book Stock.....	1 1/2 c.	@
Newspaper Stock.....	1 1/2 c.	@ 1 1/2 c.
Waste Paper and Scraps.....	1 c.	@
Kentucky Bale Rope.....	1 c.	@
Tarred Shaking.....	1 c.	@ 1 1/2 c.
Grass Rope.....	1 c.	@ 1 1/2 c.

PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., Dec. 30, 1878.

General business has been exceedingly dull the past week, as was to be expected, and as it always is during the holiday season; and, moreover, there is not likely to be much if any improvement for a couple of weeks to come, as many of our business men will be engaged during the time in question in taking stock and making annual settlements. The year just closed has been an eventful one in a business point of view, and one that will long be remembered by our merchants and manufacturers; many were forced to succumb who a year ago thought, to use a common expression, themselves "solid," while others who went into '78 with great apprehension, surrounded as they were by difficulties that appeared insurmountable, have, by hard work and great care, succeeded in getting through; and these, as might be expected, feel a good deal better now than they did one year ago. The year has also been characterized by great rascality in business circles, more so, possibly, than any preceding year in the history of the country. As soon as it became known that the bankrupt law would be repealed, a great many men whose chief object in life appears to be to get rid of paying their debts, commenced to lay their plans, and many of them before the 1st of September, when the repeal took effect, had succeeded in getting everything they had in the shape of property out of their hands. There is no question but many men went to work deliberately and systematically to take advantage of the bankrupt law, and in the manner described, by turning everything they had over to their relatives and friends, leaving nothing for their creditors, to whom, if honestly disposed, they could have paid every dollar they owed; and many people have been seriously crippled if not ruined by this kind of work. Those, however, who have succeeded in weathering the storm, who have honestly met their obligations, did not take advantage of the bankrupt law, and by their strict sense of honor and upright-ness came out of the conflict of the past five years with clean hands, need have no apprehension of the future, as the fury of the storm has certainly been spent. But those who have been crooked in their dealings and managed to get through by dishonesty have but little to hope for, as they have been spotted and will not be permitted to repeat their offense where they are known. The fear of the matter is there are a good many "behind the bars" for offenses that was no nothing compared with that of defrauding creditors by taking advantage of the bankrupt law.

As the close of the old year is at hand there is considerable anxiety in regard to the course of the Iron trade for the year 1879, and in this, as might be expected, there is a diversity of views. It is generally admitted that the volume of business in 1878 exceeded that of any former year since the panic, but, owing to the ruinous prices that prevailed most of the year, there was very little money made. Some few firms making specialties will close the year with a balance on the right side of the profit and loss account, but many will come out behind, while others will feel well satisfied if they come out even or have as much money as they had at the commencement of 1878. Our manufacturers generally sustained fewer losses by bad debts as compared with 1877, having exercised greater care, and it is worthy of mention in this connection that the market has ruled decidedly firmer during the past three or four months; manufacturers here in Pittsburgh, having determined that they will no longer sell at a loss. In some important respects the outlook is favorable for the incoming year, both as regards the raw article and the products, but the trade generally do not anticipate any very decided advance soon; on the contrary, they expect that it will be slow and gradual. It is expected that the consumption in 1879 will exceed that of 1878, with but little increase in the production, and as the cost of production is more likely to be increased than decreased, and current rates afford, under the most favorable circumstances, little or no margin for profit, it is reasonable, we think, to expect a higher range of prices. Navigation to all points is suspended, and this is not without its effect in depressing general business, which at best is always light during the last month of the year. According to the old saying, however, "It is an ill wind that blows nobody good," hence, while the suspension of navigation may curtail other branches of business, it will benefit the coal business by shutting off supplies to the down-river markets, increasing the consumption, and if it holds out long enough will enable holders to obtain better prices.

Pig Iron.—The situation remains much the same as noted in our last report. Business continues very dull. The demand is confined to supplying immediate actual wants, and the probability is that this course would be closely adhered to for some weeks to come. In regard to prices there has been no change whatever for some considerable time past one way or the other. Stocks are light, both in first and second hands, as compared with a year ago, as is also the production, and the probability is that but few of the furnaces that have been idle will be started up soon, in the absence of any inducement to do so, as there is no money in the business at current rates under the most favorable circumstances. Bituminous Coal-smelted Irons are still quoted at \$18.50 @ \$20.4 mos., for Foundry, and \$17.50 @ \$19.50 for Mill, the outside figure for all-ore Red Short. Coke Irons—\$16, cash, to \$16.50, 4 mos., for Mill. Sales of Eastern Cold Blast at \$29 @ \$32, according to quality. Bessemer Pig may be quoted nominally, in the absence of sales, at \$20.4 mos. Charcoal Blooms, \$50 @ \$60. Latest sales at \$50 @ \$55.

Manufactured Iron.—The general position of the market remains much the same as noted in our last two or three reports. Business is generally reported dull, orders are coming forward very slowly, and there is not likely to be any change for the better for two or three weeks to come. Prices are still quoted upon a basis of 1.75¢, 60 days for bars. A meeting of the Western Iron Association took place here last Friday, and it was largely attended, but nothing was done either looking to production or prices. The getting out of a new card changing the classification was discussed at considerable length, but no definite action was taken. Another meeting will take place January 9th, when it is possible something definite may be accomplished. It is well known that prices are entirely too low and should be advanced, but the trade, in view of the attempts made in the past few years to establish an advance that failed, are very timid about trying it again.

Nails.—The meeting of the Western Nail Association took place here last Thursday, when it was expected something definite would be done in regard to the "pooling system," a full report of which was published in The Iron Age of last week, but these expectations were not realized. With one or two exceptions all the firms represented signed the compact, but it is not binding, or, in other words, the arrangement is not consummated until all the factories in the West go into it. Some of the trade are now inclined to think that the arrangement will fail, while others still have hopes of its success. The next meeting takes place January 8, when the matter will again be considered. Reports come from Wheeling that the feeling there appears to be settling against the pooling business. Prices remain unchanged; 200-kg lots and upward \$2.05, 60 days, 2 per cent. off for cash; less than 200-kg lots \$2.15, 60 days.

Rails.—Steel Rails still quoted steady at \$44, cash, at mill; Steel Rail and Bloom Ends, \$32. Old Iron Rails nominal at \$23. No sales reported for several weeks.

Wrought Iron Pipe.—Discount on new card for gas, water and steam pipe, 35 @ 40; on old card, 60 to 70. As stated in our last report, there is but little difference between the net of the new and old card, as the former card was cut down almost enough to make up for the reduction in discount. Another conference of the manufacturers is to be held here in January. Business just now is dull, as it always is in December.

Steel.—The demand for all grades and styles continues light, although the mills generally are still running, some of them having been considerably behind with their orders. Prices are unsatisfactory to manufacturers, and it is believed have touched the lowest notch. The prospects are considered favorable for a brisk trade next year, and hopes of better prices are entertained. The consumption of American Steel is increasing steadily every year, its cheapness causing it to take the place of Iron for many purposes, and for the same reason Iron is being substituted in place of wood. A few years ago consumers in this country were prejudiced against American Steel, but in order to meet competition they were forced to buy, and the prejudice in question is a thing of the past.

Scrap.—The Scrap trade continues quiet, scarcely enough doing to establish prices, which are nominally unchanged. No. 1 Railroad Wrought Scrap, \$21 @ \$22, net; Old Iron Car Wheels, \$18.50 @ \$19.50, gross.

Window Glass.—The market continues very dull, with not much prospect of any improvement in the demand before February. Prices unchanged. Discounts still quoted at 75 and 5 to 75 and 10 for car-load lots.

Coke.—The demand keeps up well for the season, and the recent advance is still maintained, quoted at \$1.10 @ \$1.15 per ton, delivered free on cars at mines. Nearly all contracts are now made deliverable at mines, the purchaser agreeing to take it there.

CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts., Chattanooga, Dec. 28, 1878.

We are experiencing the usual holiday lull in lines of heavy trade and the usual briskness in fancy goods, &c. There is no change to note in prices. All crude materials have been quiet this week. Most establishments are practically idle to permit their employees to enjoy the festivities of the season. The weather in the first days of the week was rough and stormy, winding up with a smart fall of snow and the thermometer near zero on Thursday, Friday and today.

Pig Iron.—There is little actual business doing. Considerable orders are in hand to be filled at the beginning of the year. An advance in prices is confidently anticipated with the revival, and the volume of orders and the number of inquiries justify the expectation. We quote: Coke Irons, No. 1 Foundry, \$17.50 @ \$18; No. 2, \$15.50 @ \$16; Gray Forge, \$13.50 @ \$14; White and Mottled, \$11.50 @ \$12. Hot-Blast Charcoal—No. 1 Foundry, extra, \$20 @ \$21; ditto, \$18 @ \$20; No. 2 Foundry, \$16 @ \$18; Gray Forge, \$15 @ \$17; White and Mottled, \$15. Cold Blast Charcoal—Car Wheel Metal, \$22.50 @ \$27.50; do., Extra Standard, \$24 @ \$29.50; Forge, \$17 @ \$22.

Muck Bar.—\$27 @ \$34. Old Rails, \$18 @ \$18.50. Old Car-wheels, \$18.

Ores.—Brown Hematite, 50 to 56 %; per ton, \$1.75 @ \$2.25. Red Fossiliferous, 50 to 56 %; per ton, \$1.70 @ \$1.90. The above prices for ores delivered in Chattanooga on cars or on the wharf from flat boats.

Nails.—There is no change in the market. Manufacturers get rid of their products. There is not much confidence that the Western Association will make their pool work very long—if, indeed, they ever fully organize under that complicated scheme. All interested in the trade here hope the Association will meet with all and more than all the beneficial results expected from their combination. We quote at \$2.25 rates, with usual discount on job lots.

Manufactured Iron.—Trade in Manufactured Iron of all kinds has been comparatively better here than in the North since resuming business in November, mostly because of the suspension of business

in the Southwest for the preceding three months. Bar we quote at \$2; Railroad Spikes, \$2.50; Light Rail, \$2.25; Track Bolts, \$3; Trestle Bolts, \$4.

Coke.—Washed foundry, 13¢ to 15¢ per bushel, free on cars in Chattanooga. Furnace Coke in full supply at \$2 @ \$2.50 per ton.

Coal.—Competition in this article continues brisk and prices to household consumers tend downward. We quote: Strictly lump at 12¢ @ 14¢ delivered. Run of mine to manufacturers \$1.50 @ \$1.75 per ton.

Pig Lead.—From local mines 4¢.

Ingot Copper.—The slight advance realized is maintained. We quote at 18¢.

Iron Rails.—The demand is fair, mostly for rerolling. Holders are firm at \$34 per ton.

BOSTON.

Dec. 28.—Pig continues very dull. There have been no transactions of interest. At the shipping ports, Foundry No. 1 is quoted at \$16.50 @ \$17; Foundry No. 2, \$15.50 @ \$16.50; Gray Forge, \$14.50 @ \$15.50. There is nothing new in the market for Scotch Pig. Eglington is still held at \$22.50, Glen-garnock at \$24, Gartsherrie at \$25 and Coltness at \$26. Nails have been in fair demand, jobbing now at \$2.25 @ \$2.30. For 100-kg lots \$2.20 is the price. Sheet is selling at 3¢ @ 3 1/2¢ per lb. Russia is quiet at 10 1/2¢ @ 11¢. We quote English Spring Steel at 7¢ @ 8¢, gold; 8¢ @ 11¢ for German; 9¢ @ 11¢ for Machinery; 14¢ @ 15¢ for Cast; 10¢ @ 12¢ for Blister; 8¢ for American Spring; 13¢ @ 13 1/2¢ for Cast; 9¢ for Blister, and 7 1/2¢ @ 8¢ for Machinery. In Plate Iron there continues to be a fair degree of activity in Tank, which is selling steadily at 2 1/2¢. Boiler Plate is very dull, quoting 2 1/2¢ for No. 1 Charcoal; 2 3/4¢ @ 2 1/2¢ for No. 1 Shell, and 3 1/4¢ for Flange. Merchant Bar jobs at \$1.65 @ \$1.75. Copper.—The market continues quiet and steady, and we quote 16¢ for Ingot. For manufacturers we quote: New Sheathing at 24¢ @ 26¢. The outside price rules in small transactions, but large buyers are purchasing at the inside figure. Bolts are quoted at 26¢ @ 28¢. Yellow Metal Sheathing continues easy, quoting 12 1/2¢ @ 13¢ for English, and 13¢ @ 13 1/2¢ for American; Yellow Metal Bolts, 18¢ @ 20¢. Lead is steady, but is not so firm as it was a few weeks ago. Transactions have been very limited. We quote: Pig, 4¢ @ 4 1/2¢, currency; Sheet, 5 1/2¢; Pipe, 4 1/2¢; Tin-Lined Pipe, 12¢; Bar Lead, 4 1/2¢; all of these excepting Pig are subject to the usual trade or 10¢ discount. Antimony is in light demand, but is steady, and we quote 12¢ @ 12 1/2¢. Spelter is dull, being held at 4 1/2¢ @ 4 3/4¢ for the various grades. Tin is steady and firm. We quote: Straits, 15 1/2¢ @ 15 3/4¢; Banca, 18¢; Refined English, 15¢ @ 15 1/2¢, gold. We quote Plate: Charcoal, I. C., \$5.75 @ \$6; Coke, \$5 @ \$5.25; and Charcoal Terme, \$5.40 @ \$5.50, gold.—Commercial Bulletin.

ST. LOUIS.

Special report by Messrs. SPOONER & COLLINS, Iron Commission Merchants, 217 North Third street, under date of Dec. 26: The Pig Iron business has fallen off somewhat since our last report, though we anticipate an active demand after the 1st of January. Prices remain about the same. There is a fair demand for Old Rails, and they are very scarce.

COLD-BLAST CHARCOAL—All Numbers.			
Hanging Rock.....	4 mos.	\$23.00 @ 25.00	
Tennessee.....	4 mos.	22.00 @ 23.00	
Kentucky.....	4 mos.	22.00 @ 23.00	
Missouri.....	4 mos.	22.00 @ 23.00	
Georgia.....	4 mos.	22.00 @ 23.00	
Alabama.....	4 mos.	22.00 @ 23.00	
Assorted Bar Iron.....		1.95 rates.	
No. 1 Wrought Scrap.....		45 @	
Heavy Cast Scrap.....		45 @	
Light.....		40 @	
Old Rails, 1/2 ton.....	4 mos.	20.00 @ 21.00	
Old Car Wheels, 1/2 ton.....	4 mos.	17.00 @ 18.00	

CINCINNATI.

Messrs. E. L. HARPER & Co., under date of Dec. 30, write us as follows: There has been no change in prices, the demand being moderate. Sellers feel there is nothing to be gained by pressing the market at this season. The indications for a good trade early next year are favorable, and there is an impression abroad that prices will be somewhat better after the finances are finally settled and the trade of the new year fairly opens. Quotations unchanged:

HOT-BLAST FOUNDRY.			
Hanging Rock C. C. No. 1.....	\$21.00 @	19.00 @ 19.50	
C. C. No. 2.....	19.00 @	18.50 @ 19.00	
Alice, No. 1 Extra, I. M.....	20.00 @	19.00 @ 19.50	
No. 1 " " N. O.....	20.00 @	19.00 @ 19.50	
Hanging Rock Coke and S. C. No. 1.....	15.00 @	14.00 @ 14.50	
S. C. No. 2.....	15.00 @	14.00 @ 14.50	
Virginia Coke, No. 1.....	19.00 @	18.00 @ 18.50	
Shavnee S. C. No. 1.....	18.00 @	17.00 @ 17.50	
S. C. No. 2.....	16.00 @	15.00 @ 15.50	
Hocking Valley S. C. No. 1.....	18.00 @	17.00 @ 17.50	
S. C. No. 2.....	16.00 @	15.00 @ 15.50	

FORGE IRONS.			
Hanging Rock, No. 1 C. C.....	18.50 @	19.00 @	
Hanging Rock, No. 1 C. C.....	18.50 @	19.00 @	
Longdale, No. 1 Coke.....	17.00 @	17.50 @	
Ala. and Tenn. No. 1 C. C.....	17.00 @	17.50 @	
Red-short, No. 1 Coke.....	18.50 @	19.00 @	
Cold-short, No. 1.....	15.50 @	16.00 @	
Old Rails, prime.....		Cash.	

BAITMORE.
Mr. W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following prices under date of

Dec. 30: There has been little or no business transacted for the past week; values continue firm and unchanged:

Refined Bar Iron, 1 to 6 wide by 3/4 to 1 thick.....	\$1.85 @ 2	
Refined Bar Iron, 1 to 4 1/2 wide by 3/4 to 1 thick.....	1.85 @ 2	
Refined Bar Iron, 1/2 to 2, Round and Square.....	1.85 @ 2	
Hoop Iron, 1 1/2 wide and upward.....	2 1/2 @ 2 3/4	
Band Iron, from 1 1/4 to 4 in. wide.....	2 1/2 @ 2 3/4	
Horse-shoe Iron.....	3	
Norway Nail Rods.....	3 1/2 @ 3 3/4	
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes.....	13 @ 14	
Machinery Steel.....	8 @ 10	
ast Spring Steel.....	6 @ 10	
Homogeneous Steel Plate.....	7 @ 15	
Common Horse Nails.....	13 @ 15	
R. R. Spikes, 5/8 x 16.....	2 1/2 @ 2 3/4	
Perkins' Horse shoes, 1/2 keg of 100 lbs.....	3.50 @ 4	
Mule shoes.....	4 1/2 @ 5	
Putnam Horse Nails.....	18 @ 20	
Globe Horse Nails.....	18 @ 20	
Less list discount to the trade.		

Messrs. R. C. HOFFMAN & Co., Iron and Commission Merchants, No. 23 South Frederick street, report the Pig Iron market as follows, under date of Dec. 30: But few transactions in Iron for the past week, and prices unchanged from last report, viz.:

Baltimore Charcoal Wheel Iron.....	\$25.00 @ 28.00	
Virginia.....	26.00 @ 28.00	
Anthracite No. 1.....	19.00 @ 20.00	
No. 2.....	18.00 @ 19.00	
No. 3.....	16.00 @ 17.00	
Mottled and White.....	13.00 @ 14.00	
Charcoal, C. B. Blooms.....	50.00 @ 55.00	
Billets.....	52.00 @ 55.00	
Refined Blooms.....	43.00 @ 45.00	

LOUISVILLE.

Messrs. GEO. H. HULL & Co., under date of Dec. 30, write us as follows: The inquiry for all grades continues good, the demand being much above the average of the closing month of the year. Prices are firm at quotations, sellers as a rule making no concessions. The usual time, 4 months, is allowed on the quotations below:

FOUNDRY IRONS.			
No. 1 Hanging Rock, Charcoal.....	\$21.00 @	22.00 @	
No. 2.....	20.00 @	21.00 @	
No. 1 Southern, Charcoal.....	18.00 @	18.50 @	
No. 2.....	16.50 @	17.00 @	
No. 1 Hanging Rock, Stonecoal and Coke.....	19.00 @	20.00 @	
No. 2 Hanging Rock, Stonecoal and Coke.....	18.00 @	18.50 @	
No. 1 Southern, Stonecoal and Coke.....	18.50 @	19.00 @	
" Mottled and White.....	17.00 @	17.50 @	
" American Scotch.....	18.00 @	19.00 @	
Silver Gray.....	16.00 @	17.00 @	

MILL IRONS.			
No. 1 Charcoal, Cold-short and Neut'l.....	16.50 @	17.00 @	
No. 1 Stonecoal and Coke, Cold-short and Neut'l.....	16.50 @	17.00 @	
No. 2 Stonecoal and Coke, Cold-short and Neut'l.....	15.50 @	16.00 @	
No. 1 Missouri and Indiana Red-short.....	20.00 @	21.00 @	
White and Mottled, Cold-short and Neut'l.....	14.50 @	15.00 @	

CAR WHEEL AND MALLEABLE IRONS.			
Hanging Rock, Cold-blast.....	29.00 @	33.00 @	
Alabama and Georgia, Cold-blast.....	28.00 @	29.00 @	
Kentucky, Cold-blast.....	25.00 @	30.00 @	

W. B. BELKNAP & Co., Iron and Steel merchants, Nos. 113 and 115 West Main street, under date of Dec. 28, report: The old year goes out quietly, with few changes to report. The Ohio River is practically closed throughout its whole length, and steamboats have sought safe harbors to avoid the ice. There are unmistakable signs, however, of railroad prosperity, and when such is the case Iron always looks up. The Ohio Falls Car Works across the river from us has just taken a new contract for 200 cars, and mills in the neighborhood are reasonably busy. In considering the situation we should not forget that "dull" and "active" are relative terms, and the product of a mill now that is nothing to boast of would a few years ago have been reckoned as extraordinary. It used to be the custom to shut down six weeks or more in the summer, but now such a thing is unheard of, and customers with urgent special orders raise an outcry when it is suggested that supply may be even temporarily cut off. So with merchants; facilities for handling goods have largely increased, and yet there is grumbling if everyone is not pushed to his utmost. With resumption there seems to be coming a lower rate of interest, and certainly smaller as well as safer margins than used to prevail, and we may well therewith learn the lesson of content.

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows under date of Dec. 30: Nothing doing. Quotations are nominal. Business outlook for new year promises fair:

American Scotch Pig Iron.....	\$21.50 @ 22.50	
Anthracite, No. 1.....	18.00 @ 19.00	
" No. 2.....	17.00 @ 18.00	</

pounds and no more, the overland shipments having been but 1,500,000 during the interval, against 6,000,000 pounds during the same period of the previous winter. Under ordinary circumstances the statistical position on this side would have been deemed highly favorable as it stood, but the demand from manufacturers being slow, and European advices reporting a gradual decline, the tendency here became a weak one, enabling some parties to secure for European account 1,000,000 pounds Lake Copper early in April at 16½¢ @ 16¼¢, delivery spread over a period of nine months. There were besides sold in April, on the spot, 950,000 pounds at 17½¢. In London, where Best Selected had declined to £71 in March, and Chili Bars to £64, 10/s, a further decline took place in April, the former receding to £70 and the latter to £62, 10/s. Prices in Europe were borne down by the unpropitious statistical situation, the visible supply on April 1 being 41,460 tons, against 36,833 in 1877. The good effect of the contracting of some Copper for Europe in April was neutralized in May by the gradual arrival of new Copper from the Lake region, and as there was no revival in the demand for manufacturing purposes, it was evident that the mines would consult their own interests if they effected a timely sale of Copper deliverable during the summer months. They consequently resolved to do so, and some 7,000,000 pounds sold early in May at 16½¢, partly to manufacturers and partly for Europe, to be delivered during the ensuing three months. Early in May the stock at New York amounted to about 2,000,000 pounds, and as the spot sales effected during the month figured up only some 450,000 pounds at 16¼¢ @ 17½¢, there was, with the new Copper arriving, a sufficient supply left to face whatever requirements there might be, and as these were not pressing, prices from 16½¢ @ 17½¢ at the opening of the month gradually yielded to 16¼¢ @ 16½¢ at its close. The announcement that some more Copper had been bought for Europe in this country weakened the London market still more, and coinciding as it did with the disappointment that metals were not benefited by the peaceful turn of affairs in the East, a semi-panic resulted in Chili Bars, which for a day dropped to £60, 10/s, the lowest figure that had been witnessed there since the Franco-German war. Best Selected simultaneously fell to £68, 10/s. The shipments from Chili to Europe from January 1 to May 16 had been 24,111 tons, against 22,475 in 1877, 23,229 in 1876 and 21,400 in 1875. Those familiar with the cost of production of Copper in Chili, however, promptly came to the conclusion that there was nothing to warrant such low prices, and their vigorous action caused a rebound to £65, which was still £4 lower than Chili Bars stood twelve months previously. Subsequently they again yielded to £63, 10/s in the London market, at which figure the month of June closed, on the other side, while here we remained moderately active, the sales in June running up 575,000 pounds at 16¼¢ @ 16½¢, the market closing at 16¼¢ @ 16½¢. At the sale of Australian Copper at London in June, 594 tons Wallaroo sold at £73, 4/s, and 285 tons Barroo at £70, 16/s. The usual dull spell of midsummer now being upon us, and manufacturers attending to their semi-annual repairs, business became limited in volume during July, sales not exceeding 450,000 pounds at 16 @ 16¼¢, the month closing at 16 @ 16¼¢. In London, Best Selected declined from £70, 10/s to £69, 10/s, and Chili Bars from £64, 10/s to £63, the visible supply in England and France being 41,782 tons in July, against 35,578 in 1877. It may incidentally be remarked that in the American market competition between Lake Copper and Copper from other portions of the country manifested itself during the summer and ensuing months rather more than had been felt previously. In August gloomier accounts again reached us from London. Peace, it is true, had been secured, and there was nothing to prevent trade from swinging back into its wonted routine, yet it was felt on all hands that there were serious obstacles to a revival such as Copper and the remaining metals needed in view of accumulated stocks, and no abatement in production. These obstacles in the way of a revival were to be met with as much in England as on the Continent, their main source being a continued industrial paralysis. The news simultaneously cabled from Chili that serious financial troubles were developing there, furthermore contributed toward unsettling the London market; the statistical position was worse than ever, being on August 1, 43,325 tons, against 34,513 in 1877, and Best Selected gradually receded to £68, and Chili Bars to £62. The Wallaroo sale of 1000 tons showed a decline of £2 @ £2, 10/s on the June auction. Sales at New York were limited to 700,000 pounds during August at 16½¢ @ 16¼¢, the market closing at 16½¢. The month of September was again handed over to the same adverse influences in the London market we have just enumerated as ruling the previous month, and Chili Bars temporarily touched £60, while our own market remained steady and moderately active, 1,400,000 pounds selling on the spot at 16½¢ @ 16¼¢, the month winding up at 16½¢ @ 16¼¢. Early in October our mines again considered the moment an opportune one for effecting a large sale of 9,000,000 pounds, deliverable till January at 15½¢, thereby easing the situation. They were rather fortunate in not hesitating too long, for a couple of days after the conclusion of the contract, in which some of our leading manufacturers took a share the news of the great bank failure in Glasgow was received which unsettled business for the time being both in Europe and here. There had been exported from the United States from Jan. 1 to Oct. 1, 1878, 9,910,338 pounds of Copper, against 8,406,354 during the same period in 1877, to be followed during the remaining quarter by about 4,000,000 pounds. Aside from the large sale we have alluded to, there sold in October, 1,000,000 pounds on the spot at 15½¢ @ 16¼¢, closing at 15½¢. In the London market Chili Bars suddenly dropped from £58 to £56, 10/s, when the failure of the house of Sawers & Co., Liverpool, was announced, but promptly recovered to £57 when it became known that the interests of the firm in Chili Copper had been secured against any forced realization.

tinued failures in England and some important ones at Hamburg and in Saxony, at first exercised a depressing influence on both sides of the Atlantic, but it soon became evident that there was no financial crisis to be apprehended in England, the bank discount at London having appreciated one per cent. and no more. Copper was thus permitted to recover in the London market, the more so as it was discovered that manufacturers were holding comparatively moderate stocks, and that the shipments from Australia would remain limited for the time being. Chili Bars consequently rose to \$66.10 in November. The sales in this market in November were limited to 1,000,000 pounds at 15 1/2¢ @ 16¢, closing at 15 1/2¢. In December the market was moderately active, sales running up 1,000,000 pounds at 15 1/2¢ @ 16¢, closing at the latter figure. London settled down to \$64 with Best Selected and to \$57.10 with Chili Bars. The shipments from Portage and Torch Lakes, through the Portage River Improvement Canal, during the season of navigation 1878, have been 8,395,368 pounds Refined and 9,347,733 mineral Copper.

Value of Ingot Copper at New York in currency.

1873.	1874.	1875.	1876.	1877.	1878.
January.....	35	36	37	38	39
February.....	35	36	37	38	39
March.....	34	35	36	37	38
April.....	34	35	36	37	38
May.....	34	35	36	37	38
June.....	34	35	36	37	38
July.....	34	35	36	37	38
August.....	34	35	36	37	38
September.....	34	35	36	37	38
October.....	34	35	36	37	38
November.....	34	35	36	37	38
December.....	34	35	36	37	38

European Statistics.

1877-Dec. 1.....	Price of Chili Bars, \$ a. d.	Visible supply in England & France, Tons.
1878-Jan. 1.....	60	36,861
Feb. 1.....	60	37,793
March 1.....	60	40,835
April 1.....	60	41,460
May 1.....	60	42,725
June 1.....	60	42,809
July 1.....	60	41,782
Aug. 1.....	60	43,325
Sep. 1.....	60	44,985
Oct. 1.....	60	46,757
Nov. 1.....	60	47,587
Dec. 1.....	60	47,073
1874-Dec. 1.....	57	37,668
1875-Dec. 1.....	57	39,249
1876-Dec. 1.....	57	37,693
1877-Dec. 1.....	57	36,861
1878-Dec. 1.....	57	47,073

Tin.

During nine months of the year the course of tin has been nearly uninterrupted downward, for a number of reasons. In the first place everybody engaged in the metal trade had for years past been losing money on it, and confidence in it had been lost. Speculators for a rise had long been disgusted with it, and what little faith there had remained in its eventual recovery disappeared when we were told of the new sources of supply at a comparatively low cost from Tasmania, where the Mount Bischoff and other mines were adding to the already considerable shipments from the mainland of Australia. Although the circumstance that tin was as cheap as copper evidently was well calculated to stimulate its consumption for many purposes, production continued to exceed the enlarged demand, and European statistics, despite the satisfactory deliveries, still remained unfavorable. In the United States, it is true, consumption had increased considerably, proportionately more so than in Europe, but at best this could hardly form a sufficient offset against the excess of production in Australia. Where a really promising field for a largely increased consumption might open, it was admitted, would be China at about its current value, and anticipations in this respect have been fully realized. At all events the experience of the year has shown that tin is still capable of an extraordinary temporary rebound in spite of the many adverse circumstances it has to contend with, and that it is well worth watching. The year opened here with Straits tin at 15 1/2¢, and in London at \$65. The supply here being ample and the demand slack, a decidedly downward tendency soon developed, carrying down the price to 14 1/2¢ @ 14 1/4¢ toward the close of the month, while London gradually gave way to \$63.10, and Singapore dropped from \$18.75 per picul to \$18.50. Accounts came to hand from Banca showing that the supply for the year had been 65,000 piculs. The Banca sale in Holland had come off at equal to \$68. In February our market, under heavy arrivals, gave way still further, the more so as futures (lots still) were constantly offering 1/4¢ @ 1/2¢ below spot prices, the month closing at 14 1/4¢, while London remained steady, and Singapore declined to \$18. Although early in March there were still offers for this country from the Straits some 20,000 slabs, rather a better feeling obtained as the month advanced, there being signs of an improved spring demand, and the better tendency being fostered moreover by more favorable cable advices from England, Holland and Singapore. London recovered to \$64.10, Singapore to \$18.75 and the Dutch sale averaged 41 guilders. Toward the close a slight reaction occurred here and abroad, but our market nevertheless wound up at 14 1/4¢ @ 14 1/2¢. News reached us from the Straits settlements that the production there in 1877 had been 250,000 piculs, against 220,000 in 1876 and 210,000 in 1875. The April visible supply in England and Holland was 17,103 tons, against 17,260 in 1877, and the London price for Straits \$63.10, against \$70.10 the previous year. The month proved a dull and weak one, both here and at London, prices being carried down to 14 1/4¢ here, and to \$62 there, while Singapore continued to fluctuate between \$18.25 and \$18.50. In May the uncertain aspect of politics in Europe continued to weigh heavily on the markets, restricting new undertakings, and caused tin to recede temporarily to \$60.10, while the Dutch sale came off nearly a couple of guilders lower at 39.37 1/2, but finally there was a recovery to \$62. Singapore had remained unaltered throughout at \$18.25. The market here kept tolerably steady, with a moderate business, and closed at 14 1/4¢. In June news reached us from Tasmania of new tin discoveries at Mount Hemakirk, on the West Coast, and coupled with large amounts of tin known to be afloat this way from the Straits, some

15,000 slabs, caused great dullness, the price declining to 14 1/4¢. There were continual fluctuations at London, Straits declining from \$63 to \$61, and recovering to \$62, while Singapore held steady between \$18.25 and \$18.37 1/2. The visible supply in England and Holland on July 1 was 17,914 tons, against 17,904 in 1877, the London stock being 9500. Accounts came to hand from Netherlands India that Billiton production in 1877 had been 61,794 piculs, against 59,533 in 1876. In July extreme dullness caused holders of tin to press sales in this market, especially distant lots afloat, which were offered at 13 1/2¢, spot tin dropping to 13 1/4¢. Both London and Singapore remained unaltered, the former at \$61 and the latter at \$18.25. On Aug. 1 the London stock had increased to 10,100 tons, the entire visible supply at the time being 18,490 tons, against 18,250 in 1877. Trade in tin remained lifeless at New York throughout the month, spot Straits declining to 13 1/4¢ and afloat to 13 1/2¢. London dropped to \$60 and Singapore to \$17.50. On Sept. 1 the London stock had reached 10,120 tons, and the market there became very much demoralized, Straits at one time dropping to \$55.15, while Singapore, on the contrary, kept steady at \$17.75. The September Dutch sale came off at 37 guilders. Straits here early in the month sold at 13 1/4¢ @ 13 1/2¢, and was offered at 13¢ to arrive without buyers. Soon, however, a favorable reaction set in on the strength of an improving statistical situation on this side, the discovery being made that at ruling low prices consumption had absorbed rather larger amounts than had been anticipated, the quantity afloat at the same time becoming quite moderate. Our market recovered to 13 1/4¢ @ 13 1/2¢. The month of October was ushered in at London under exceptionally unpropitious circumstances in consequence of the Glasgow and other important failures, and in a panic Straits was forced off at \$53, Singapore simultaneously declining to \$17.50. But this demoralized condition of the tin market lasted but for a day and was immediately followed by a vigorous rebound, a syndicate of operators having taken charge of the metal in the London market. Coinciding with this recovery did with the improvement previously inaugurated at New York, there was no serious obstacle to a prolonged upward movement. Even the continued failures in England proved no impediment, inasmuch as they did not assume the character of an approaching financial crisis. Prices here rapidly rose to 15 1/2¢, London recovered to \$60 and Singapore to \$18, the excitement being equally great in all the leading tin markets. In November news reached us that the shipments from Australia to England had latterly been abating materially, and that the accounts from Tasmania had been very much exaggerated so far as an immediately increased supply from there was concerned. Holders and speculators for a rise had no difficulty in pushing prices a little further in November, the price here gradually advancing to 16 1/4¢ @ 16 1/2¢; in London to \$65, and at Singapore to \$20, the closing figures of the month. Outside of the principal tin markets this extraordinary rebound in the metal had, however, been received with distrust and hesitation from the very commencement, particularly so in France and Germany, the great tin consuming countries on the Continent, and in those localities the cold shoulder was given to a movement which they looked upon as mainly speculative, and therefore evanescent, unless based either on a really increased consumption or an undoubted curtailment of production. Add to this the persistency with which failures continued both in England and Germany, and the undeniable distress in industrial circles all over Europe, and it became pretty clearly perceptible that the metal would soon again be abandoned by its chief supporters. December consequently found tin ready once more for its habitual recoil and a rapid downward course of prices was inaugurated at once on both sides of the Atlantic, values receding as the month advanced till about the middle of it, when, after declining to \$60, Straits recovered to \$62.10, while we steadied here at 15 1/2¢ @ 15 1/4¢. During the latter half of December business became flat, while stocks began to accumulate. London wound up the year at \$61, Singapore at \$18.75 and we at 14 1/4¢ @ 14 1/2¢.

Lowest and Highest Price of Straits Tin at New York:

1877.	1878.	1879.
January.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
February.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
March.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
April.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
May.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
June.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
July.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
August.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
September.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
October.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
November.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢
December.....	15 1/2¢ @ 17 1/2¢	14 1/4¢ @ 15 1/2¢

Price of Banca Tin in Holland in Guilders the 50 Kilos:

Jan. 1.....	1870	1871	1872	1873	1874	1875	1876	1877	1878
Feb. 1.....	77	82	85	70	57	50	45	40	40
Mar. 1.....	77	82	85	70	57	50	45	40	40
Apr. 1.....	77	82	85	70	57	50	45	40	40
May 1.....	77	82	85	70	57	50	45	40	40
June 1.....	77	82	85	70	57	50	45	40	40
July 1.....	77	82	85	70	57	50	45	40	40
Aug. 1.....	77	82	85	70	57	50	45	40	40
Sep. 1.....	77	82	85	70	57	50	45	40	40
Oct. 1.....	77	82	85	70	57	50	45	40	40
Nov. 1.....	77	82	85	70	57	50	45	40	40
Dec. 1.....	77	82	85	70	57	50	45	40	40

Tin Plates.

Tin Plates have been remarkably steady in this market during the year just come to a close; they have declined it is true, but this decline has been very gradual and has amounted to not quite 10%, spread over a whole twelvemonth. Consumption has developed satisfactorily in the United States, and the Welsh makers would have no cause for complaint if other countries had proved as steady customers as we have been. The following table will show the course of Tin Plate values since the panic.

Average Value of Ordinary Brands per Box at New York at Different Dates:

July 1, 1874.....	\$2.72	February 28, 1878.....	\$5.66
April 28, 1876.....	6.58	March 31, 1878.....	5.66
May 1, 1877.....	5.97	April 30, 1878.....	5.70
September 9, 1877.....	6.20	May 31, 1878.....	5.35
October 19, 1877.....	5.97	June 15, 1878.....	5.37
December 20, 1877.....	5.85	July 15, 1878.....	5.33
December 31, 1877.....	5.77	October 3, 1878.....	5.18
January 1, 1878.....	5.75	December 18, 1878.....	5.38

Closing prices for ordinary brands Dec. 31: Charcoal Bright, \$5.87 1/2 @ \$6.25; ditto Ternes, \$5.25 @ \$5.37 1/2; Coke Tin, \$5 @ \$5.12 1/2; and ditto Ternes, \$4.87 1/2; average, \$5.30.

Lead.

Of the various metals produced in the United States Lead is the one enlisting, we believe, the most general interest, inasmuch as its future is intimately linked with that of Silver, of which our country is at the present day the greatest producer. The extensive utilization of argentiferous Lead ore in the West has opened, so to say, a new horizon for the precious as well as for the base metal. Aided by the latest inventions and the most powerful methods of extraction and reduction in vast regions apparently inexhaustible in Silver-bearing Lead, there is indeed no saying what our capacity of production may be at some future day if we go on expanding as we have done during the past three or four years. The consequence has been a gradual unsettling of values. The bulk of Silver production thus far has been in Nevada in connection with Gold, but the amount of Silver drawn from the Lead mines has also been steadily increasing, and the incentive thus held out simultaneously swells the output of Lead to large proportions. The question has at once suggested itself where to find an outlet for the increasing surplus, and preparations were made early in the year to introduce our Common Domestic Lead in China and Europe from the moment it should decline sufficiently to warrant the experiment with a view to its continuation. Lead declining to nearly 3¢ here, shipments were made to China from California, a diversion all the more desirable in the latter State, since the Pacific Coast would gradually become a little less dependent on Eastern prices. If these shipments, probably aggregating some 7000 tons for the year under review, have not proved very profitable, they have in all likelihood given as good results as if the Lead had been shipped round the Cape to New York, and at all events American Lead is making its way into China, a large consumer, and displaces European. The shipments hence to Europe were trifling, and came to an end the moment prices began to recover here. As matters stand it is, we believe, pretty generally admitted in this country that we shall continue producing Lead in excess of our own means of absorption, even if times greatly improve in all Lead-consuming branches, and that consequently the necessity of a large and continuous outlet abroad will again and again be pressed upon our consideration whenever a surplus weighs heavily on our markets and produces an unexpected decline. The year 1878 will therefore be a memorable one in the metal trade, inasmuch as it gave us a forecast of the future of Lead among us. Production in the United States in 1877 was estimated at 72,000 tons, against 57,000 in 1876 and 53,000 in 1875. The year 1878 opened at 4.35¢ @ 4.50¢ for Common Domestic, but gradually declined to 4¢, sales during the month of January aggregating some 1200 tons, mostly to arrive, the bulk at 4¢. On January 1, English Pig stood at London at £19.57. News reached us from England that the shipments from London and Liverpool to China and Japan had been 16,469 tons in 1877, against 9327 in 1876, and 8901 in 1875, but a trifle thereof to the latter country. A dragging sort of business prevailing in February, prices weakened, and toward the close of the month gave way to 3 1/4¢ @ 3 1/2¢, total sales having been 600 tons. In March accounts came to hand from Germany stating that a very large Lead production was anticipated in Western Prussia. In the same month the Lead producers had a convention at St. Louis, agreeing not to sell any common Lead under 4¢. It had been hoped that they would rather agree on a reduced output instead of endeavoring to regulate prices. At all events our market took no notice of these measures, and with a slack demand 900 tons sold in March, partly to arrive, at 3 1/4¢ @ 3.90¢, closing at 3 1/2¢. April was inaugurated again in a dull mood, but some spring demand manifesting itself while the month proceeded, the market became more active, and some 1100 tons sold at 3 1/4¢, at which the market closed with some firmness. In May the statistical position became more and more unfavorable, the stock being 5,000 tons, and some 2300 tons being afloat due within the next six weeks, with no pressing wants on the part of the trade. Holders consequently showed more willingness to part with what they had, and 1000 tons changed hands at 3 1/4¢ @ 3 1/2¢, but the bulk at 3 1/4¢. Some inquiries about Lead arrived from Europe, but did not yet lead to any shipments, the price asked here still being too high. In June a further decline was, however, brought about in this market during the first half of the month, some 200 tons changing hands at 3 1/4¢ @ 3.20¢. Subsequently larger orders came dropping in at 3.20¢, but could not be filled. Some 250 tons sold at 3 1/4¢, smaller lots at 3.35¢, the market soon rising to 3 1/2¢ for large parcels, and to 3 1/4¢ for smaller ones, but even at these figures no much was procurable. On June 1st English Pig had declined to £16.15/ at London. July opened in this market with a stronger feeling, some 400 tons selling at 3 1/2¢, but the advance could not be sustained, and after some sales at 3.20¢, rallied to 3.35¢ @ 3.37 1/2¢, the closing figure. Although in August the stock had increased to some 7000 tons, the bulk was held by financially powerful parties, and it would have been easy to advance prices and keep them there but for the dismal news reaching us from the South, where the yellow fever was commencing its ravages and contributed a great deal toward flattening the markets for everything, including the demand for shot for that section. The sales of Lead during the month did not, therefore, exceed 300 tons, and after recovering to 3 1/4¢, prices soon receded to 3 1/2¢, the closing quotation. In September the fall demand for other sections of the country manifested itself strong enough to lead to some more business, 1000 tons changing hands at 3.35¢ @ 3.40¢, at which the market closed. Early in October news reached us that the Eureka Works in Colorado had been burned, equal to a curtailment of the supply thence at the rate of 1000 tons per

month for three months to come—a circumstance not failing to effect some increased firmness, and, together with the stiffness of chief holders, leading to a strong market, notwithstanding a lessened demand. Sales in October summed up altogether some 1000 tons at 3 1/4¢ @ 3 1/2¢, part to arrive. In November the demand fell off still more, sales not exceeding 500 tons, the price, through reduced offerings, gradually being raised from 3.60¢ to 3.90¢. The demand slackened still more in December, sales being limited to some 300 tons at 3.90¢ @ 4¢. English Pig declined in the London market to £15.5/. The exports of Lead from London and Liverpool to China during the first 11 months of this year amounted to 9638 tons, as against 13,289 tons for the same period of 1877, and to Japan, 869 tons and 1625 tons respectively.

Lowest and Highest Price of Common Domestic Lead at New York per 100 Pounds.

1877.	1878.	1879.
January.....	\$6.15 @ \$6.30	\$4.25 @ \$4.00
February.....	6.30 @ 6.40	3.87 1/2 @ 3.50
March.....	6.50 @ 6.75	3.60 1/2 @ 3.80
April.....	6.40 @ 6.45	3.80 @ 3.62 1/2
May.....	6.00 @ 5.55	3.62 1/2 @ 3.45
June.....	5.60 @ 5.70	3.20 @ 3.12 1/2
July.....	5.37 1/2 @ 5.25	3.62 1/2 @ 3.20
August.....	5.00 @ 4.90	3.35 @ 3.45
September.....	4.75 @ 4.60 1/2	3.45 @ 3.30
October.....	4.25 @ 4.37 1/2	3.37 1/2 @ 3.62 1/2
November.....	4.50 @ 5.00	3.55 @ 3.90
December.....	4.50 @ 4.37 1/2	3.95 @ 4.00

Spelter.

The New York market has lost much of its importance so far as the dealings in Spelter are concerned. Some five years since Silesian Spelter was still largely consumed in this country, and New York was the principal port of entry for it. By degrees our Spelter production became more important, the quality of Western Spelter improved, and the use of foreign Spelter has now been superseded by the domestic article almost altogether. Nevertheless a great deal of the Western Spelter is still sold at New York in consequence of the importance of the agencies and metal trade here, as well as by virtue of the financial facilities radiating from the center of traffic. The railroads and telegraphs now facilitate direct shipments from the works to the Eastern places of consumption, although the distribution may take place through the intervention of New York. The general tendency of the market, both for Common Domestic and Silesian, during the year under review has been a downward one; there have been few fluctuations and the various months have ranged as follows: January, Domestic, 5 1/4¢ @ 6¢, and Silesian, 6¢ @ 6 1/2¢; February, 5 1/4¢ @ 5 1/2¢, and 5 1/2¢ @ 6¢; March, 5 1/4¢ @ 5 1/2¢, and 5 1/2¢ @ 6¢; April, 5 1/4¢ @ 5 1/2¢, and 5 1/2¢ @ 6¢; May, 4 1/4¢ @ 5 1/4¢, and 5 1/2¢ @ 6¢; June, 4 1/2¢ @ 5¢, and 5 1/2¢ @ 5 1/2¢; July, 4 1/4¢ @ 5¢, and 5 1/2¢ @ 5 1/2¢; August, 4 1/4¢ @ 5 1/2¢, and 5 1/2¢ @ 6¢; September, 4 1/4¢ @ 5¢, and 5 1/2¢ @ 5 1/2¢; October, 4 1/4¢ @ 5 1/2¢, and 5 1/2¢ @ 5 1/2¢; November, 4 1/4¢ @ 5¢, and 5 1/2¢ @ 5 1/2¢; December, 4 1/4¢ @ 5 1/2¢, and 5 1/2¢ @ 5 1/2¢.

Lowest and Highest Price of Domestic Spelter at New York.

1877.	1878.	1879.
January.....	6 1/4¢ @ 6 3/4¢	5 1/4¢ @ 6¢
February.....	6 1/4¢ @ 7¢	5 1/4¢ @ 5 1/2¢
March.....	6 1/4¢ @ 6 1/2¢	5 1/4¢ @ 5 1/2¢

True Merit and Excellence is the Basis of all Success.



The Eureka Steam and Hydraulic Packing.

PATENTED JUNE 11th, 1878.

In calling the attention of the trade to this article of Steam Packing we do it with a full knowledge of its merits. It has, from the time of its first introduction, met with the most unqualified approval of all who have used it, and by them pronounced the best article of its kind yet invented. Samples and price list with discounts furnished on application.

James Rowland & Co., 520 N. Del. Ave. PHILADELPHIA, May 6th, 1878. GENTLEMEN.—We have used "Eureka Packing" some twelve months; it has given entire satisfaction, and we find it superior to all other packings we have ever used for Steam or Hydraulic purposes. Yours, truly, JAMES ROWLAND & CO., Kensington Iron and Steel Works.

Treasury Building, Washington, D. C. TREASURY DEP., April 22d, 1878. GENTLEMEN.—I have been using your "Eureka Packing" for a year, and in a long experience I find it the most durable and economical packing for Water and Steam I have ever used. Respectfully, JAMES VERMILLION, Engineer Treas. Building.

Etruria Pottery Company. (Successors to Ott & Brewer.) TRENTON, N. J., Sept. 2d, 1878. GENTLEMEN.—We have been using your "Eureka Packing" for more than a year, and find it better for packing Steam Engine Pumps than anything ever before used. ETRURIA POTTERY CO., JOSEPH OTT, Pres.

Permanent Exhibition Co., Centennial Grounds. PHILADELPHIA, Aug. 16th, 1877. GENTLEMEN.—This is to certify that I have used "Eureka Steam Packing" in the piston and valve rods of the Buckeye Engine furnishing power for the machinery at the Permanent Exhibition, and I pay scarcely any attention to the stuffing boxes since using it, and they are always tight, the effect on the rods is to make them smooth and bright and keep them so. E. H. SCHNEIDER, Engineer.

SYMONDS & CO., Patentees & Sole Manufacturers, 38 N. 3d St., Philadelphia.

D. K. MILLER LOCK CO., 712 Cherry St., Philadelphia.

Greatly improved. Prices reduced. As now made it is the best and most economical Pad Lock for all uses extant. Appreciated by all who use them. For simplicity, compactness, durability, convenience and security it has no equal. Springs now made from the celebrated Phosphor Bronze. We make these Locks with Master Keys when so ordered. Largely used by the U. S. Government, Railroads, Corporations, etc., etc. Samples of 1/4 in. size sent per mail on receipt of one dollar.

CARRIAGE HARDWARE AND MALLEABLE IRON.

IVES, WOODRUFF & CO., Mount Carmel, Conn.

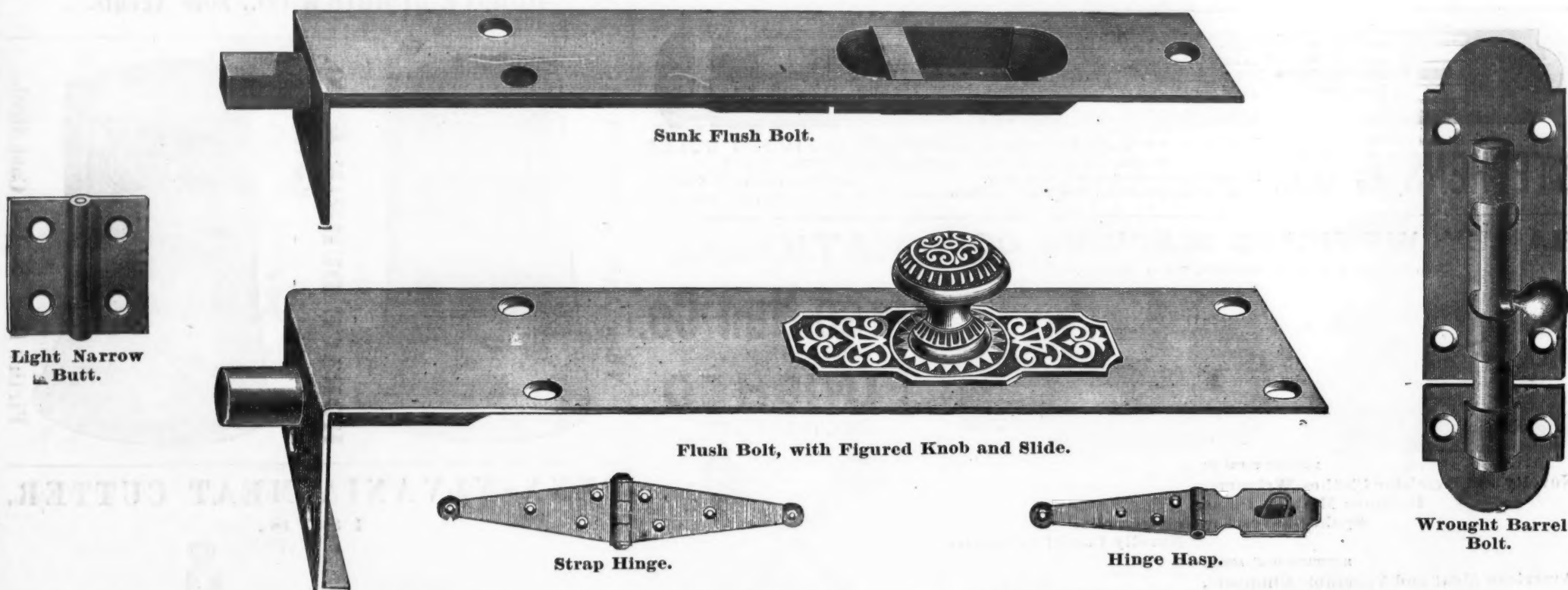
THE STANLEY WORKS,

MANUFACTURERS OF

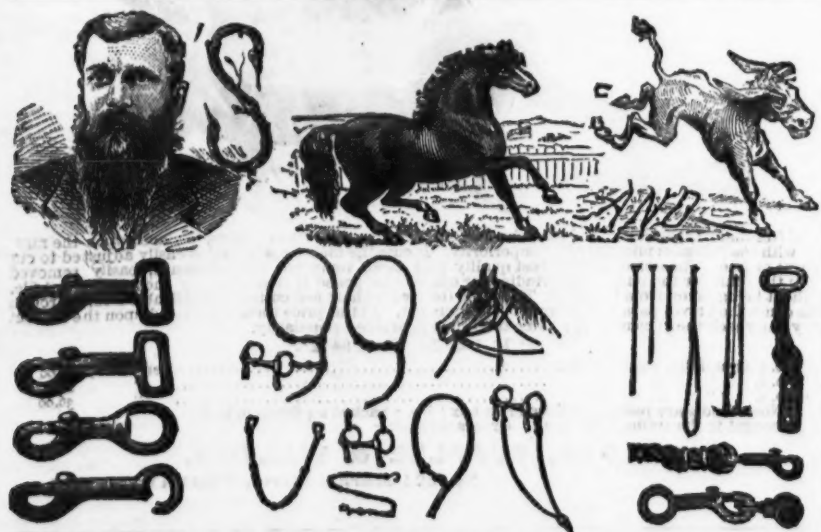
Wrought Iron Butts, Strap and T Hinges, Flush Bolts and other Door Bolts, Washers, Etc.

FACTORIES, New Britain, Conn.

WAREHOUSE, 79 Chambers St., New York.



Can furnish **WROUGHT IRON BUTTS**, both **COMMON** and **BRIGHT** finish.
A Full Stock of Butts, Hinges and Door Bolts on hand, and can fill orders promptly.



COVERT'S HORSE AND MULE JEWELRY.

Consisting of Covert's Celebrated Harness Snaps, Swivel Snaps, Open Eye Bit and Chain Snaps, Snap and Thimble for Horse and Cattle Ties, Rope Goods consisting of Horse Ties, Cattle Ties and Halter Leads, Leather Horse Ties, Breast Chains, Halter Chains, Martingale Chains, Rein Chains, Post Chains, Post Rops, &c. These goods are far superior to anything of the kind on the market. They have from real merit become standard, and never fail to give entire satisfaction. They are sold by all leading jobbers in general and saddlery hardware at manufacturers' prices. Special attention is called to our new patented Rope Goods. No more braiding or winding ends with cord; all accomplished with machinery by clamping the rope with steel rings, which enables us to make better goods at reduced prices. Send for catalogue and price list. Address **COVERT MFG. CO.,** Sole Manufacturers, Troy, N. Y.

THE TURNER & SEYMOUR MFG. CO.,

MANUFACTURERS OF

Upholsterers', Stationers', House
Furnishing and Fancy
HARDWARE AND NOTIONS.

Fancy Brass Goods and Small Iron Castings to order.

SPECIALTIES.

Shade Fixtures and Trimmings in great variety.

Picture Nails, Knobs, Hooks, Cord, Wire, &c.

Ink Stands of Superior Finish.

Twine Boxes, Escutcheon Pins, Curtain Rings, Nutmeg Graters.

The Best American Cast Scissors and Shears.



The "Family" Egg Beater.

Best ever made for the price.

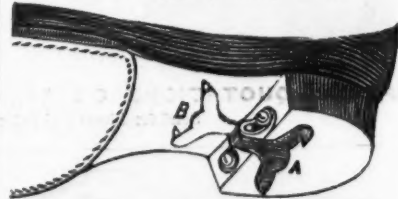
Both Floats revolve, giving the double motion necessary to a perfect Beater.

FACTORY, Wolcottville, Conn.

WAREHOUSE, 81 Reade Street, New York.

ICE CREEPERS.

Perfect Safety Secured in Walking on Ice or Slippery Pavements.



"A" represents the Creeper in position ready for use.

"B" shows the Creeper thrown back entirely out of the way when not in use, or walking in doors.

This CREEPER has advantages over all others: Its simplicity of construction, being easily adjusted, always ready for use, and when not needed can be instantly turned under the "Shank" out of the way, therefore not interfering with walking in the house on carpets, &c.

When in position for walking on ice it is a sure protection from falling.

A sample pair will be sent by mail to dealers on receipt of 25 cents; also terms and discounts for quantities on application to

E. T. BARNUM,

118 and 120 Woodward Ave.,
DETROIT, MICH.

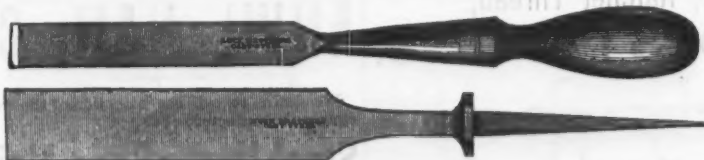
Agents wanted in every city.



Price, \$5.00.
In Morocco Case,
\$5.50.

MICROMETER CALIPER,
Made by THE VICTOR SEWING MACHINE CO.
Middletown, Conn.

This attractive and very desirable tool will be found more reliable and convenient than the Vernier Caliper, and to Machinists and Tool makers it is indispensable on work requiring very accurate and close measurement. Its capacity is one inch, and is graduated to one thousandths, but can readily be set one-half and quarter thousandths; and is so constructed that any wear resulting from use can be readily adjusted.



BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of

Shank, Socket Firmer and Socket Framing Chisels,
PLANE IRONS.

Gouges of all lengths and circles beveled inside or outside. Nail Sets, Scratch and Belt Awns, Chisel Handles of all kinds. Carving Tools. Also small Boxes of tools of best quality.

THE DEXTER CARRIAGE SPRING

Combines
Strengh,
Durability,
Beauty. It is
Graceful,
Noiseless,
Light and Easy.

The **DEXTER SPRING** is the most perfect Carriage Spring ever invented. Wherever it is known it is rapidly superseding all others for pleasure vehicles. It is especially recommended for use on the rough roads of new countries, as its peculiar construction relieves the strain on the vehicle and shock to the passenger, while the high grade of material used reduces the probability of breakage to a minimum.

For circulars, prices, &c., address

DEXTER SPRING CO., Hulton, near Pittsburgh, Pa., U. S. A.

THE SWIFT MILL.

ESTABLISHED 1845.

The annexed cut shows one of the many styles of Coffee Mills of our manufacture, especially adapted to Grocers' use and all retailers of coffee. They are highly ornamental, and workmanship of the very best. We make more than 30 styles.

ALSO LANE'S PORTABLE COFFEE ROASTER

Will roast 30 to 40 lbs. at once, and can be used as a stove at other times. Send for descriptive list to Manufacturers.

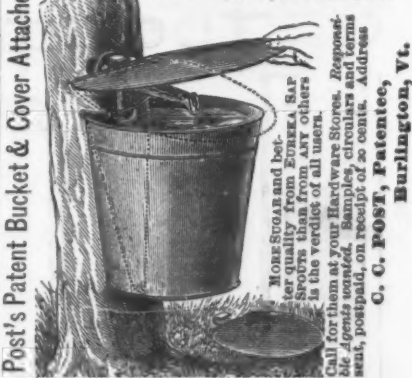
LANE BROS., Millbrook, N. Y.

Also sold by leading wholesale houses.

Our agents, Graham & Haines, 113 Chambers St., New York, carry a full line of our goods, and will be pleased to serve you at Factory prices.

THE SUGAR MAKERS' FRIEND

Over 2,500,000 in Use.



Post's Patent Bucket & Cover Attached.

The Patent Combined
**Dinner-Pail and
Lantern.**

The most perfect Dinner Pail in the world. Hot coffee for dinner and a Lantern at night.

Manufactured by **JOS. HAUGHT**
Post, Chester, N. Y.

Sent by express on receipt of \$1.00. Special attention given to export orders. Travelling Agents Wanted.

Goodell Company's Plated Table Cutlery.



The demand for a SUBSTANTIAL Table Knife has very naturally made an immense sale of solid steel handled plated goods. The great weight of these Knives and the extremely small size of the handles are serious objections. We are now making a Knife elegant in appearance, with a light and full-sized handle, and fully equal to the solid handle in every other essential particular. They are plated with pure silver in the best possible manner, and prices are "rock bottom" for a genuine article. We are also making several other styles of Plated Cutlery.

Correspondence solicited.

GOODELL COMPANY, Antrim, N. H.



Manufacturers of

COOPERS' TOOLS AND STAVE KNIVES,

Made from the best English Steel, and are warranted not to be soft and to be clear from flaws in the Steel.

The proprietors, after many years' experience, are enabled to furnish work of the best finish and quality, at lowest rate. We make all kinds of Knives for which a pattern is furnished. For price list apply to

M. GREGG & SON, Rochester, N. Y.

STILES' IMPROVED PATENT POWER SHEARS.



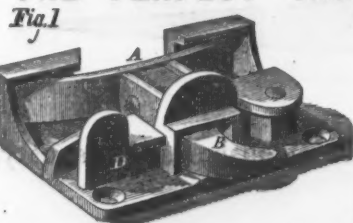
Will Cut all kinds of Sheet Metal.

They are made extra strong. In their manufacture no expense has been spared either in material or workmanship. They are furnished with front and back gauges. We also make, when ordered, in place of the ordinary back gauge, one moved with screws, and graduated so it can be set to any part of an inch.

We make three sizes, to cut sheets 30, 36 and 42 inches wide, up to 3-16 inch thick.

STILES & PARKER PRESS CO.,
Middletown, Conn.

THE PERFECT SASH TIGHTENER AND LOCK.



Manufactured entirely from Malleable Iron, Burglar Proof, Anti-Battling, Draws Sash to Exact Center. No Springs to Get out of Order.

The Best in the Market.

METALLIC CLOTHES PIN.

For either Wire or Rope Line, Will securely hold any article, from a silk handkerchief to a carpet. No article can be blown away. Does not soil the clothing. Manufactured by

CLARK & SMITH, Patentees, Chester, Orange Co., N. Y.

J. I. BROWER & SON,

286 Greenwich St., New York,

Who keep a general assortment on hand for the country trade. Jowett's Horse Raps, 14, 25 and 36 inch, Maharay's \$10 Tire Chiuser, Heller's Raps. Send for Circular. SPECIAL DISCOUNTS TO JOBBERS.

NOTICE

TO THE

Hardware Trade

in all Parts of the

WORLD.

You are hereby NOTIFIED that from this date on, December 2, 1878, the

Patent "Eclipse" Fan

Blower,

Tire Benders,

Centennial Jump Seat

Irens,

AND THE

Scandinavian Jail Pad Locks

will be offered at a BARGAIN and all goods GUARANTEED.

AGENCIES SOLICITED at home and abroad on easy terms.

Address the Manufacturer,

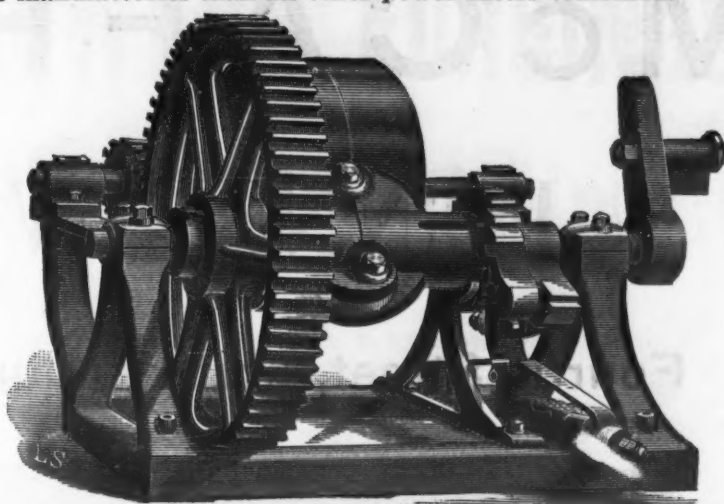
EZRA F. LANDIS,

Lancaster, Penn.,

U. S. A.

MILO PECK'S POWER LIFTER,

Invented over a quarter of a century ago, has been improved from time to time, steadily keeping the lead, and is in use to-day in more manufactories than all other power lifters combined.



This Lifter can be applied to any Drop in use, and does not require any attachment bolted to either hammers or uprights.

Peck's Drop Press a Specialty.

Eleven regular sizes, both for stamping sheet metals and for forging Hammers from 50 lbs to 2500 lbs. Send for 1879 illustrated price sheet.

BEECHER & PECK,

157 Temple Street, - New Haven, Conn., U. S. A.



Before making arrangements for Lawn Mowers for the coming season you will do well to correspond with

OHIO MANUF'G CO.,

71 Central Way, CLEVELAND, OHIO.

MAKERS OF THE

Least Complicated, Lightest Running and Best Lawn Mower ON THE MARKET.

EXCELSIOR FILE WORKS.



G. F. STOTT, Proprietor,
Rochester, N. Y.



Carriage, Tire, Machine, Plow, Stove and Spring Bolts, Coach and Bed Screws, &c.

BIRMINGHAM, CONN.

GEO. N. PIERCE & CO.,

Buffalo, N. Y.,

Sole Manufacturer of the

Celebrated "Gem" Coal Hod.

Patented September 21st, 1875.



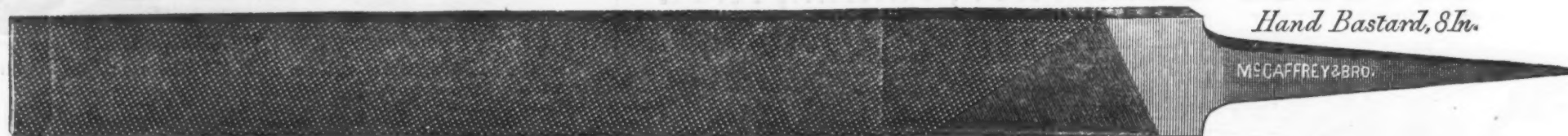
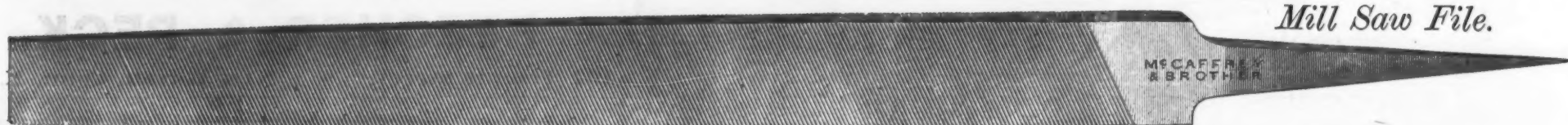
These Coal Hods are made in three styles, Japanned, Bronze Band and Galvanized, and in five sizes, viz., 15, 16, 17, 18 and 20 inch. They are all made of Refined Iron, with bottoms double seamed and the rims riveted to the body of the Hod. We also manufacture a large assortment of House Furnishing Goods. Send for illustrated catalogue and price list.

McCAFFREY & BRO.,

PENNSYLVANIA FILE WORKS,

Fourth Street, north Columbia Avenue,

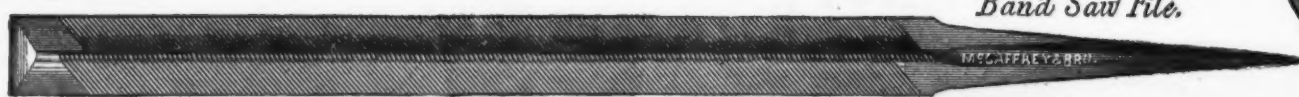
- - PHILADELPHIA.

*Hand Bastard, 8In.**Mill Saw File.**Round File, Bastard, 8In.*

PHILADELPHIA,

*Taper Saw File, 4 1/2In.*

1876.

*Band Saw File.*

PARIS,



FRANKLIN INSTITUTE,



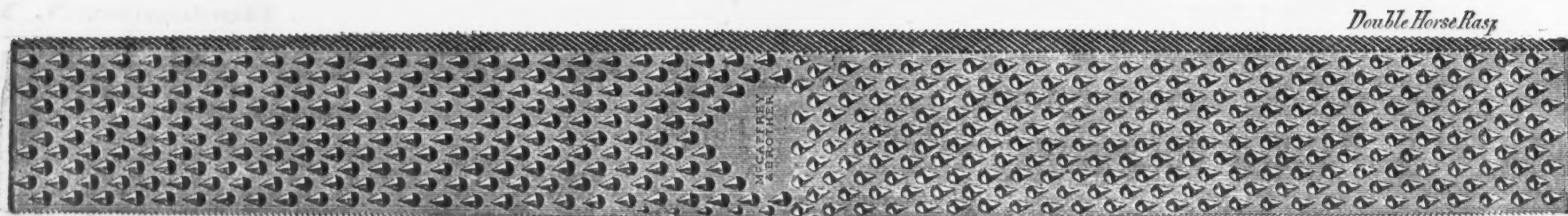
TRADE MARK.



1874.



1878.

*Four-Square File, Bastard, 8In.**Double Horse Rasp**Flat File, Bastard, 8In.*

In calling the attention of the Trade to our brand of FILES and RASPS, we have the satisfaction of knowing that since our establishment in January, 1863, our relations have been of the most friendly kind, and return our sincere thanks to our patrons for their encouragement.

We have far exceeded our expectations of giving our customers a FILE and RASP that could not be excelled. Our many specialties, exclusive attention and practical experience have enabled us to put upon the market a FILE and RASP that for durability and excellence there is not an equal at present in existence.

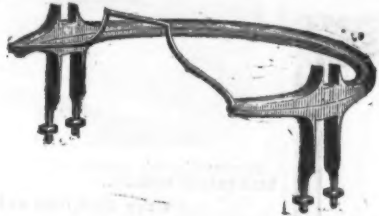
We were awarded the Medal for Superiority, being the highest prize for Files and Rasps at the Exhibition Universelle, Paris, 1878; and wherever exhibited our goods have taken the first premium.

Our customers may depend that our efforts shall not be relaxed in keeping up our hard-earned reputation, and ahead of competition in our line. Would be pleased if foreign as well as domestic buyers would allow us to compete for their trade, by placing at least a portion of their orders with us.

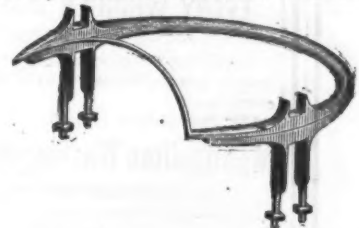
SPECIALTIES IN CARRIAGE HARDWARE FORGINGS

MANUFACTURED BY
WILCOX & HOWE,
 BIRMINGHAM, CONN.

No. 1, DERBY FIFTH WHEEL.



No. 2, DERBY FIFTH WHEEL.

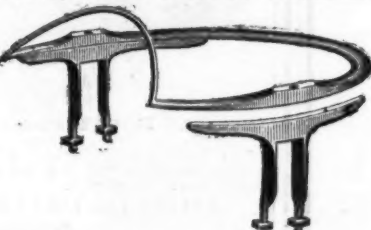


No. 3, CINCINNATI FIFTH WHEEL.



The Cheapest first-class Wheel in the market.

No. 4, OHIO FIFTH WHEEL.



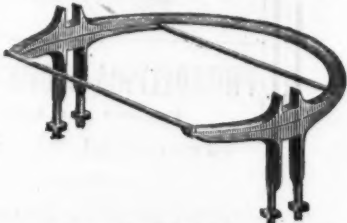
The cheapest anti-rattler made.

LARKIN'S PATENT ANTI-RATTLER FIFTH WHEEL.



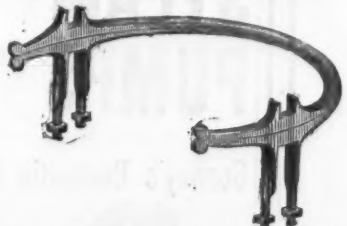
Three styles, viz: With No. 1, 2 or 3 top. Cut represents Derby No. 1 top, with extra square, or spot for reach. Nos. 5, 6 and 7.

No. 8, FIFTH WHEEL.



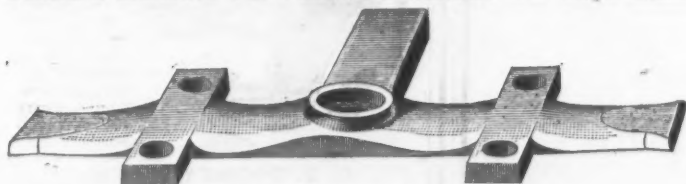
With Derby Top. Also made with Nos. 1, 2 or 3, or Scroll Top Wheel. Be particular in ordering.

No. 9, FIFTH WHEEL.



With Derby Top. No. 10 has Cincinnati Top, with scroll ends. Also made without scroll ends on bottom wheel.

DERBY REACH OR PERCH PLATE.—For Single Reach.

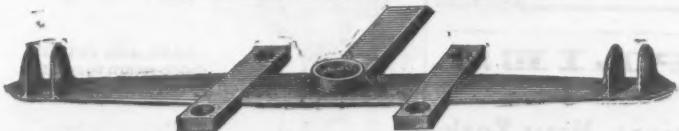


The above cut represents the under side.

This is forged from a solid bar of best Norway Iron, and the ends are left long enough to answer for any diameter of Fifth Wheel. The center hole is made to accurately fit king bolt. Also made for Double Reach.

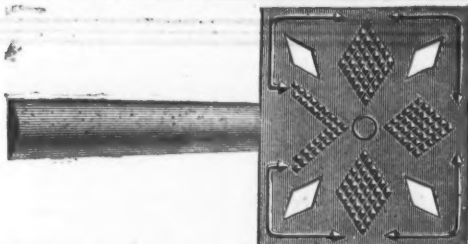
DERBY REACH PLATE.

With Putnam's Patent Fifth Wheel Guards.



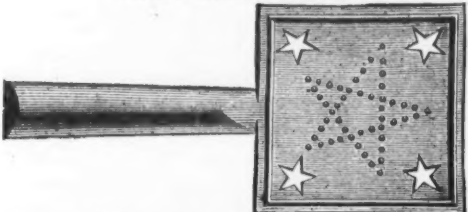
This invention, used in connection with Wilcox's Patent Fifth Wheel Anti-Rattler, prevents any danger of accident from the breaking of king Bolt.

OPEN DIAMOND STEP.



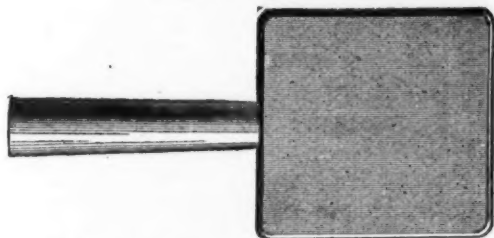
Forged from best Norway Iron. Three sizes: No. 1, 3x3 1/4; No. 2, 3 1/2 x 4; No. 3, 4 x 4 1/4 in. Made under patent of April 11, 1876. Also made without open diamonds in corners.

OPEN STAR STEP.



Forged from best Norway Iron. Three sizes: No. 1, 3 1/4 x 3 1/4; No. 2, 3 1/2 x 3 1/2; No. 3, 4 x 4 in. Made under patent of April 11, 1876. Also made without open stars in corners.

PLAIN STEP.



Made from best Refined Iron. The cheapest and best Plain Step made. Three sizes: 3x3 1/4, 3 1/2 x 4, and 4x4 1/4 in.

SHORT JOINT EYES.



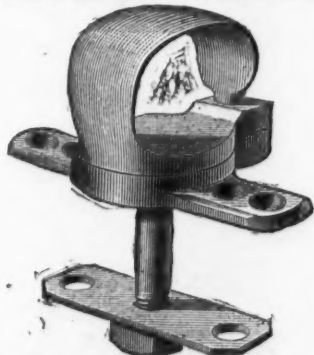
Round or Oval, 3/4 to 9-16 in. hole for prop. Four dozen in a box.

LONG JOINT EYES.



Sold in sets. Round Joint Eyes are made from 7-16 and 1/2 in. iron. Oval Joint Eyes from 1/2, 9-16, 3/4, 1 in. iron. Size of hole for prop, 3/4 to 9-16 inch. In ordering, state what prop you use.

WHIFFLETREE COUPLING.



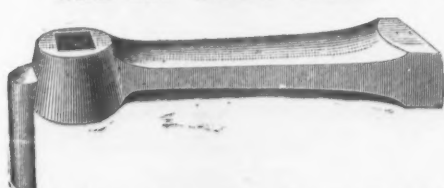
Top plate, bolt and clip made in one piece, from best Norway Iron. Patented February 18, 1876. One dozen in a box.

IMPROVED BODY LOOP.



Patented May 18, 1869. Five sizes: for 3/4, 1, 1 1/4 and 1 1/2 in. spring bar. 3/4 in. has 1/2 in. hole, 1 in. has 5-16 in. hole, and 1 1/4 and 1 1/2 in. have 3/4 in. hole for bolt. Made from best Norway Iron. Two doz. in a box.

ONE LIP BODY LOOP.



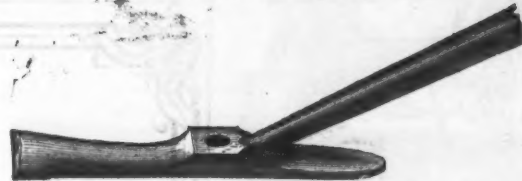
Made from best Norway Iron. Three sizes: for 3/4, 1 and 1 1/4 in. spring bar. 3/4, 5-16 or 3/8 inch hole, as ordered. Two doz. in a box.

WILCOX'S PATENT FIFTH WHEEL ANTI-RATTLER.



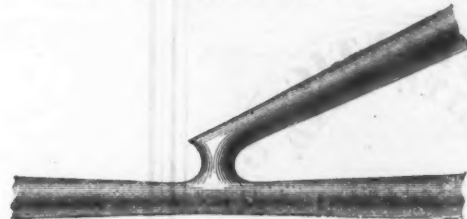
A represents a rivet, and B, rubber which placed in recess makes a perfect Anti-Rattler. For 3/4 and 1/2 Fifth Wheels.

No. 1, STAY-END.



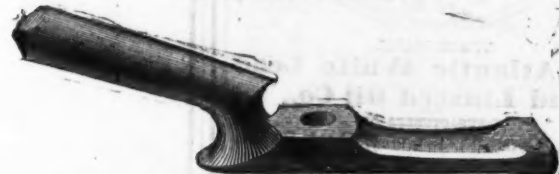
Made from one piece of best Norway Iron, under letters patent of Oct. 22, 1873, and Dec. 21, 1875. Two sizes: 3/4 and 7-16, and 1/2 in. Two dozen in a box.

No. 2, OFFSET.



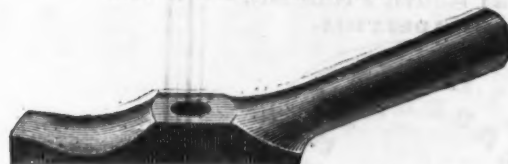
Forged from one piece of Norway Iron. Made under patents of Oct. 22, 1873 and Dec. 21, 1875. Four sizes: 3/4, 7-16, 1/2 and 9-16 in. Two dozen in a box.

No. 3, STAY-END.



Made under letters patent of Oct. 22, 1873 and Dec. 21, 1874. Four sizes: 3/4, 7-16, 1/2 and 9-16 in. Two dozen in a box.

No. 4, NEW STAY-END.



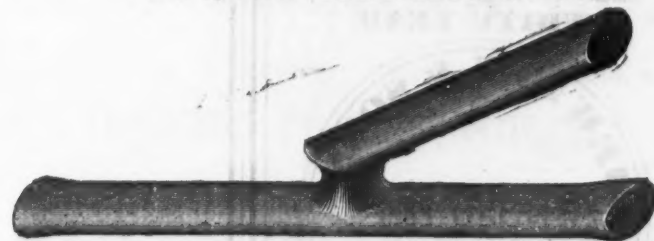
Made from best Norway Iron, under letters patent of Sept. 1, 1874. Desirable for plain work. Four sizes. Two dozen in a box.

No. 6, NEW OVAL STAY-END.



Made from best Norway Iron, under letters patent of Sept. 1, 1874. Five sizes: 9-16x3/4, 5/8x3/4, 1/2x7-16, 3/4x1/2 and 1x1/2 in. Two dozen in a box.

No. 7, NEW OVAL OFFSET.



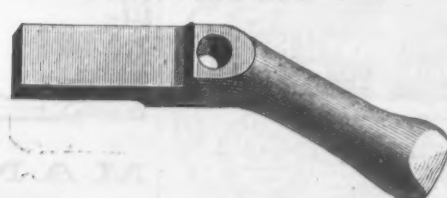
Made from best Norway Iron, under letters patent of Sept. 1, 1874. Five sizes: 9-16x3/4, 5/8x3/4, 1/2x7-16, 3/4x1/2 and 1x1/2 in. Two dozen in a box.

STRAIGHT STAY-END TIE.



Made for 3/4, 7-16, 1/2 and 9-16 in. Stays, from best Norway Iron. The shape is such that it can be used with Round or Oval Stays. The back hole can be drilled to fit any size of axle. Two dozen in a box.

BENT STAY-END TIE.



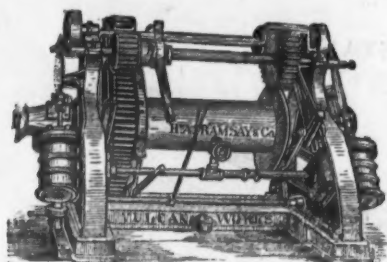
Made for 3/4, 7-16, 1/2 and 9-16 in. Stays, from best Norway Iron. The shape is such that it can be used with Round or Oval Stays. The back hole can be drilled to fit any size of axle. Two dozen in a box.

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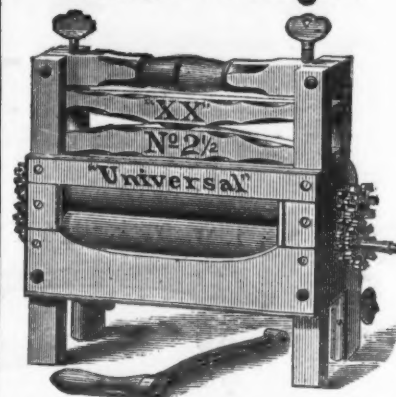
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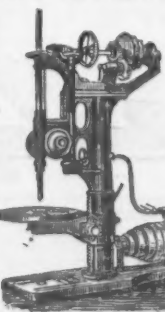
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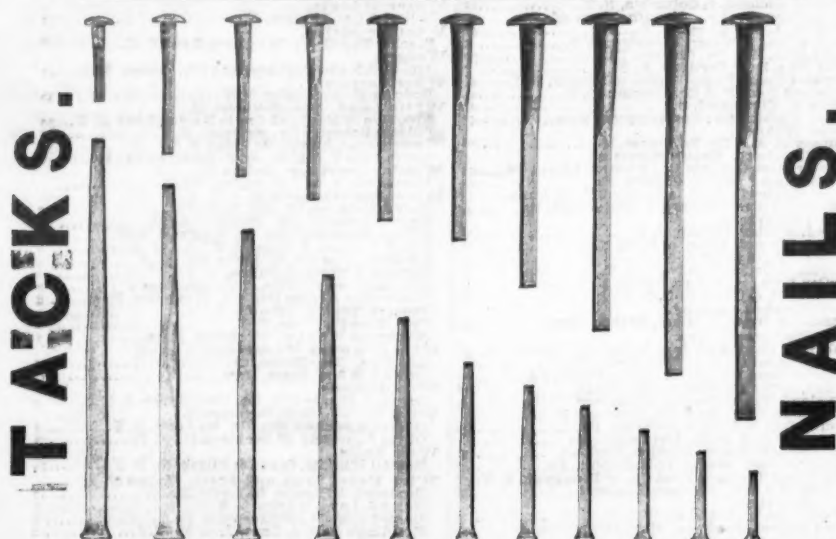
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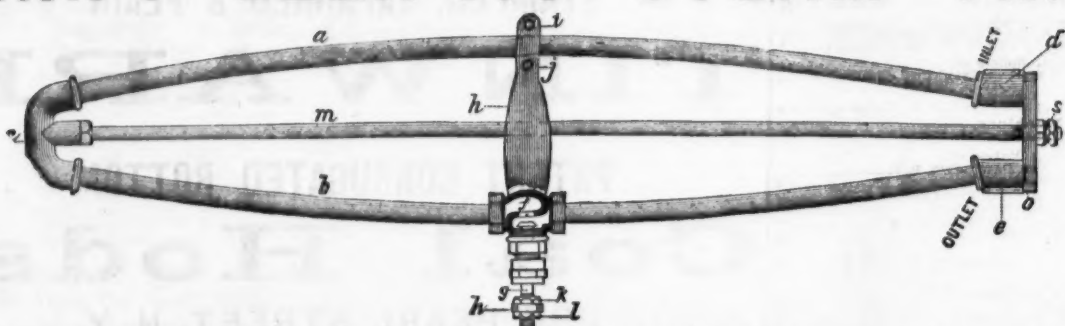
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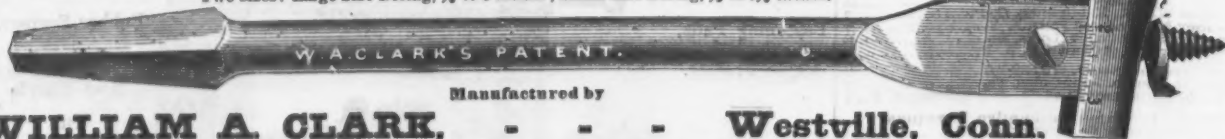
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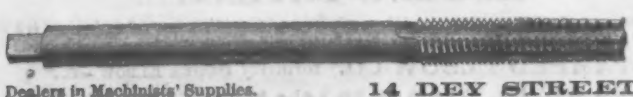
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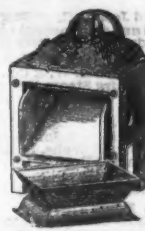
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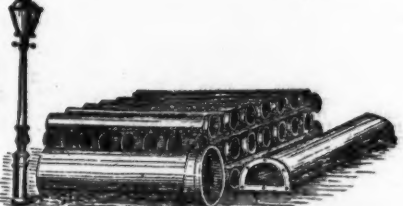
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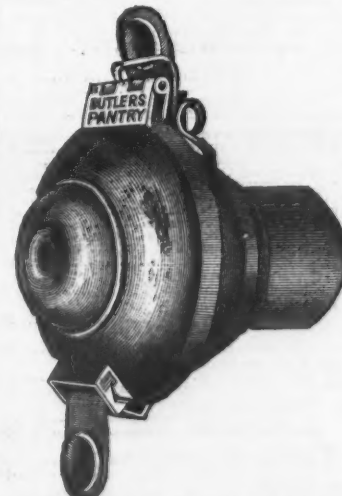
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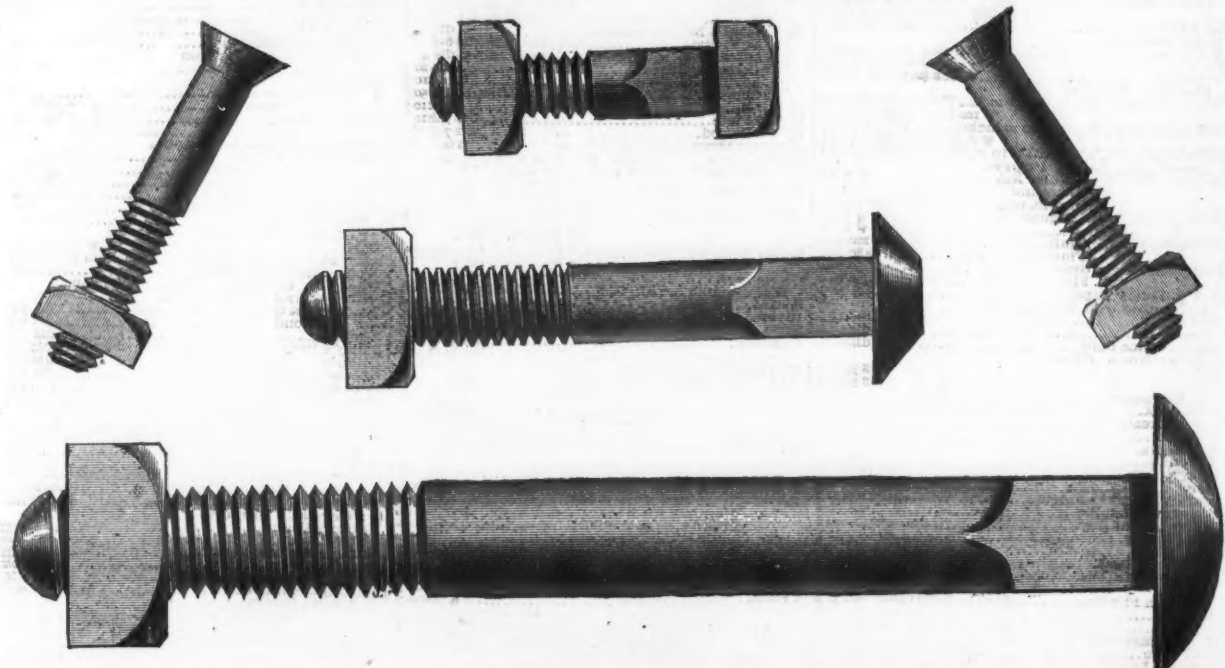
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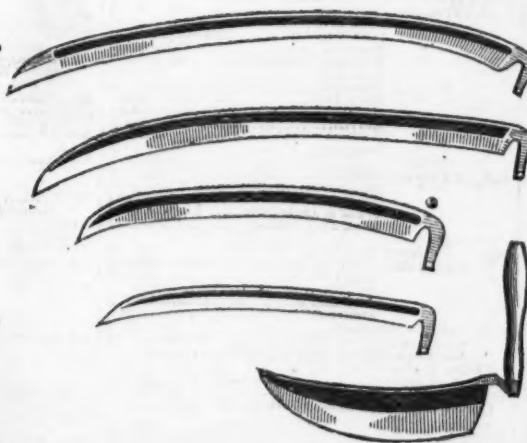
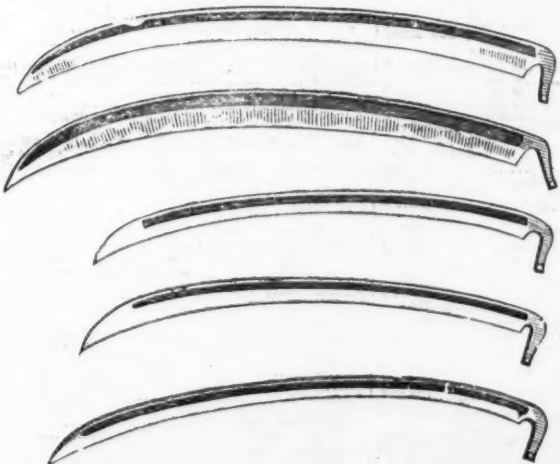
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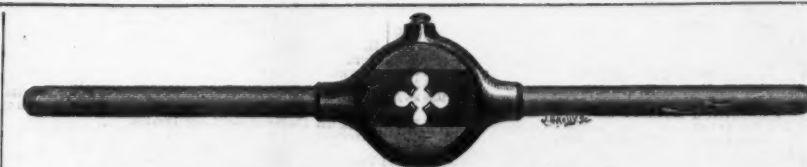
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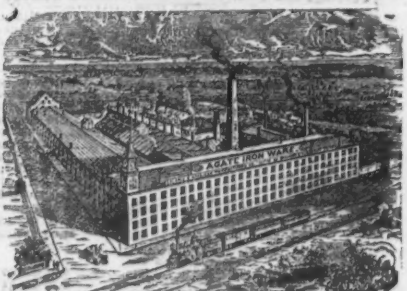
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Boys' Tool Chests, Architectural Building Blocks

Toys, &c. **Pawtucket, R. I.**





The large sales which have attended the introduc-

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it. It is the best article of the kind in market, and

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JOHN WILSON'S CELEBRATED

BUTCHERS' KNIVES,
BUTCHERS' STEELS,
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SHOE KNIVES.THE TRADE MARK, IN ADDITION
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IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY
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BEARING THE NAME, "WILSON," ONLY.

Works:—SYCAMORE STREET, SHEFFIELD. ESTABLISHED in the Year 1750.

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ESTABLISHED 1857.

CAPITAL, \$3,000,000.

INCORPORATED 1859.

Works at Chicago, Ill., and Milwaukee, Wis.

MANUFACTURERS OF

MERCHANT BAR, FISH PLATES, PIG METAL,
IRON RAILS & BESSEMER STEEL RAILS.

CAPACITY OF WORK.	
Fish Plates.....	20,000 tons.
Merchant Bar.....	40,000 "
Pig Metal.....	50,000 "
Iron Rails.....	50,000 "
Steel Rails.....	50,000 "
Total Capacity per year.....	260,000 "

OFFICES:

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Portable Forges.

Several sizes and 30 styles, for every purpose from the
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Sizes from six inches to six feet.

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Thorough in its Working.APPROVALS.
We have no hesitation in recom-
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MACOMBER, BIGELOW & DOWSE,
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It far exceeds any machine for
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It proved to be one of the best labor-saving ma-
chines that I know of, for the amount it cost.
Prices per doz., \$24, \$27, \$33, with good pans.
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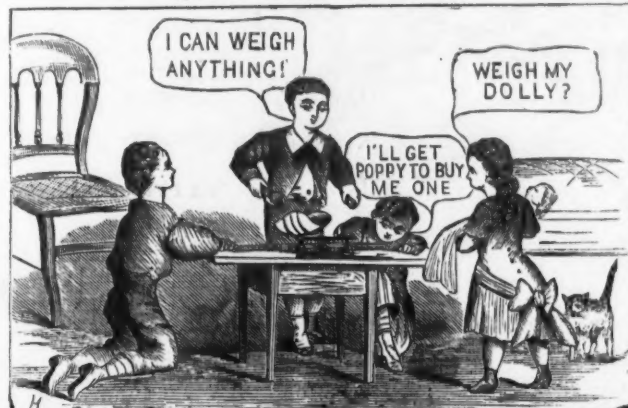
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The cutting parts are made of the very best English Cast Steel. The
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Equal to the best and lower in price. Send for Illustrated Catalogue.

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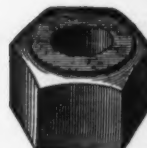
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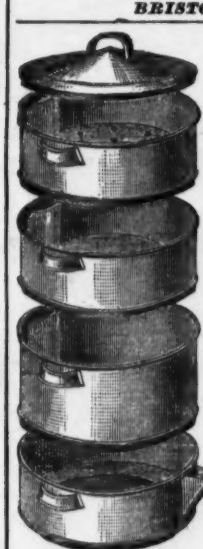
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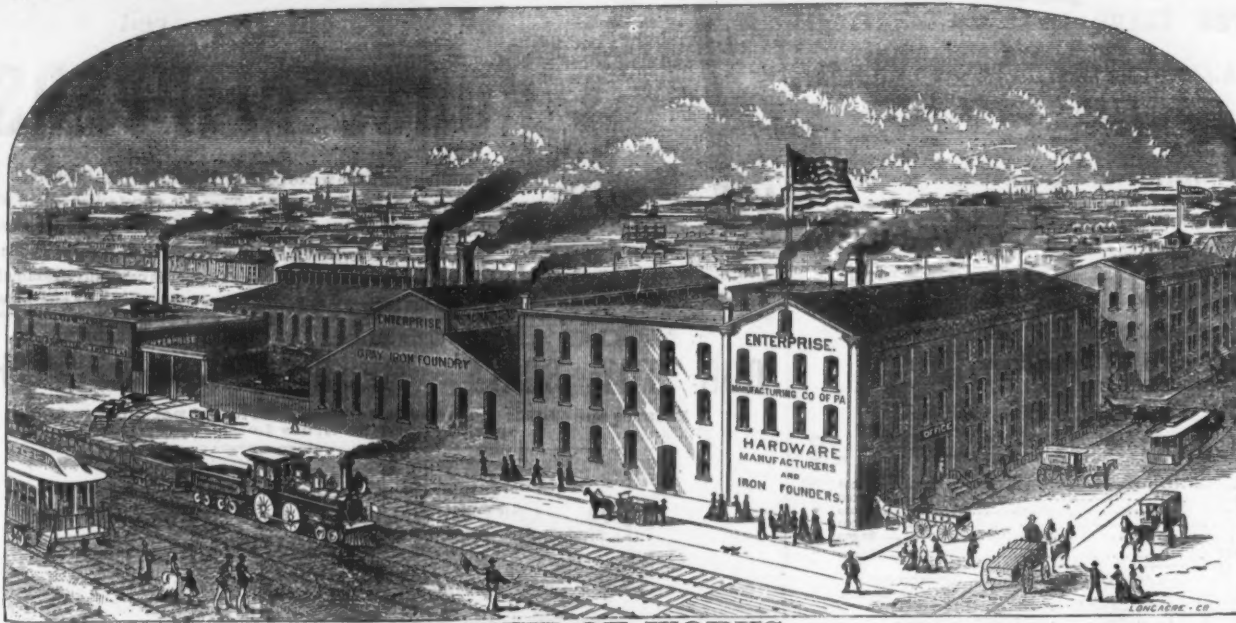
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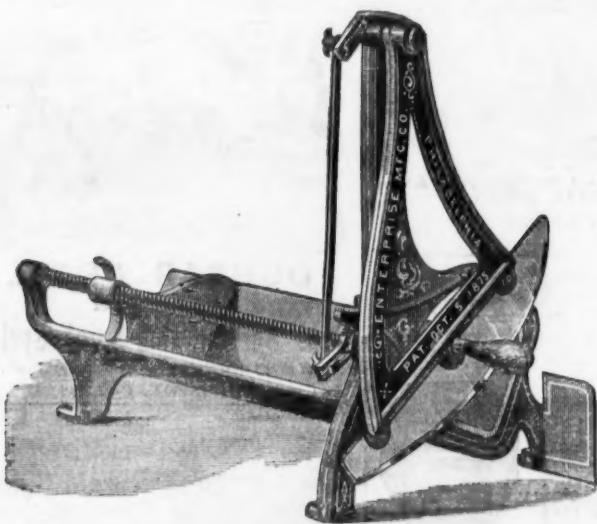
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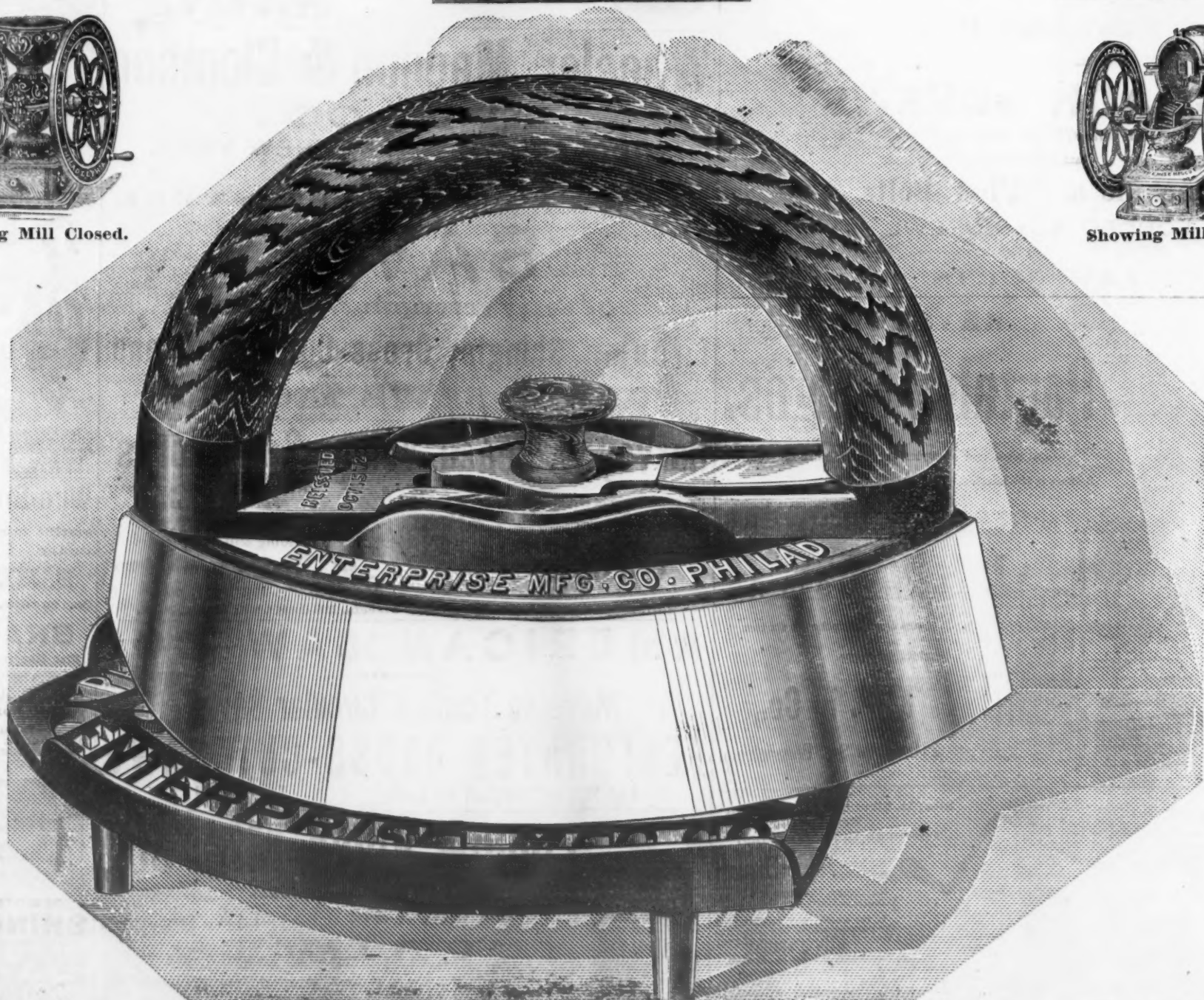


Showing Mill Closed.



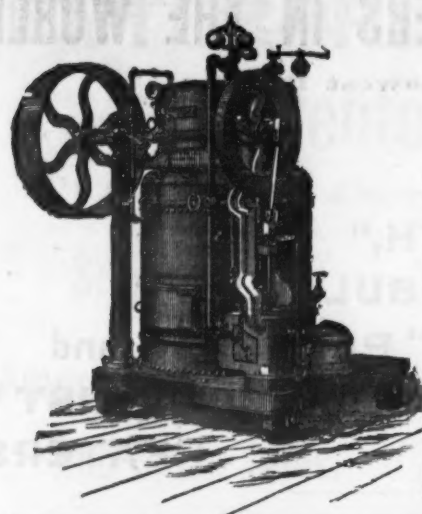
Showing Mill Open

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Compact, Practical, Durable and Economical.

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Also Machinery for Mills of all kinds and Tanneries. Also their celebrated Bark Mills, acknowledged to be the best. Send for reduced price list circular.

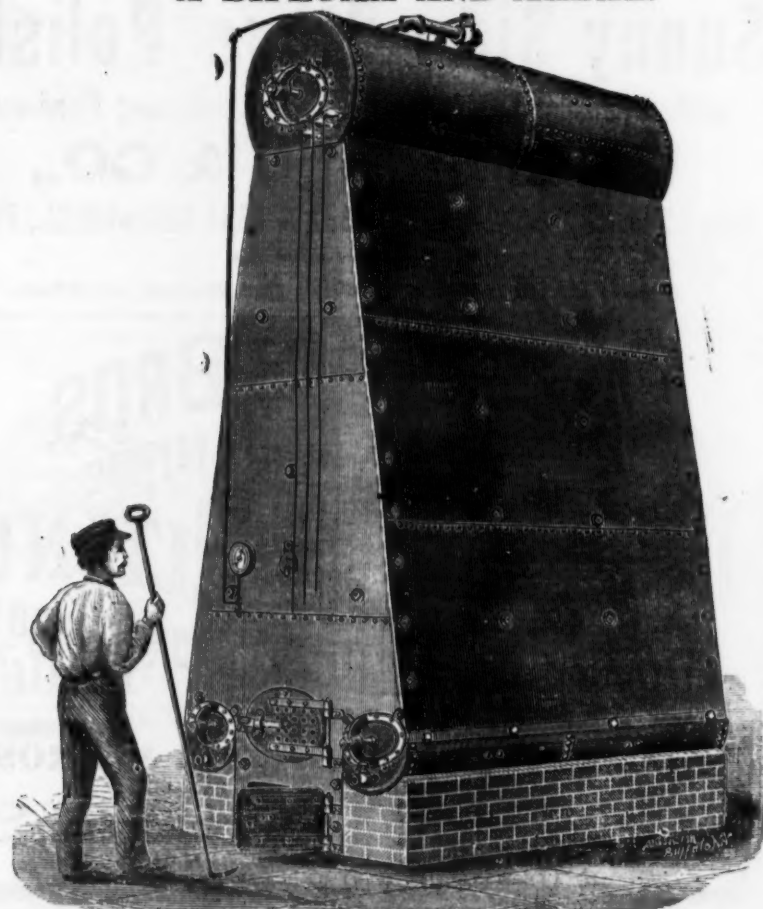
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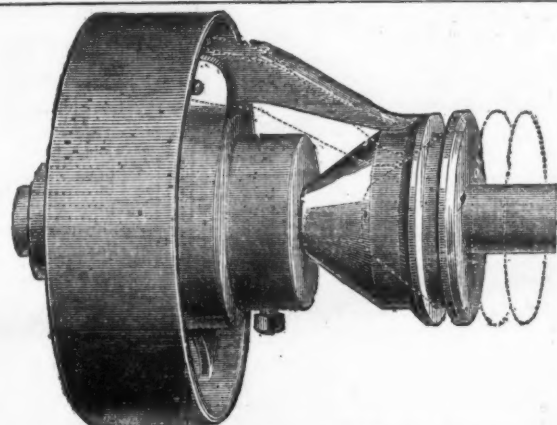
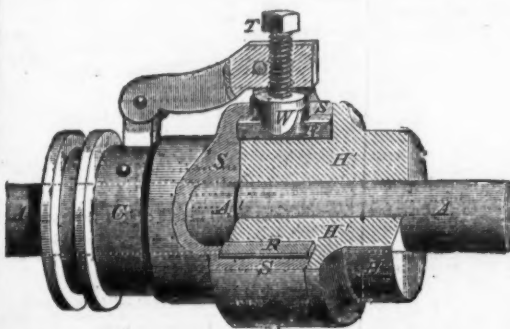
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The working surface is in one piece of Jessup's Best Tool Cast Steel, which, being accurately ground, is hardened and given the proper temper for the heaviest work. The horn is covered with and its extremity made entirely of steel. The body of the Anvil is of the strongest grade of American iron, to which the cast-steel face is warranted to be thoroughly welded and not to come off.

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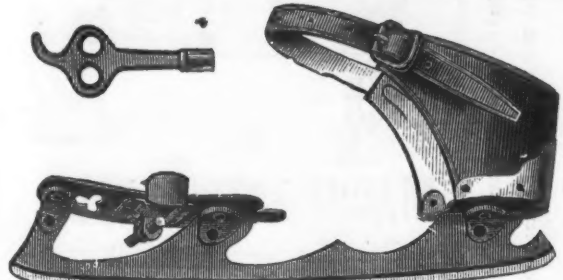
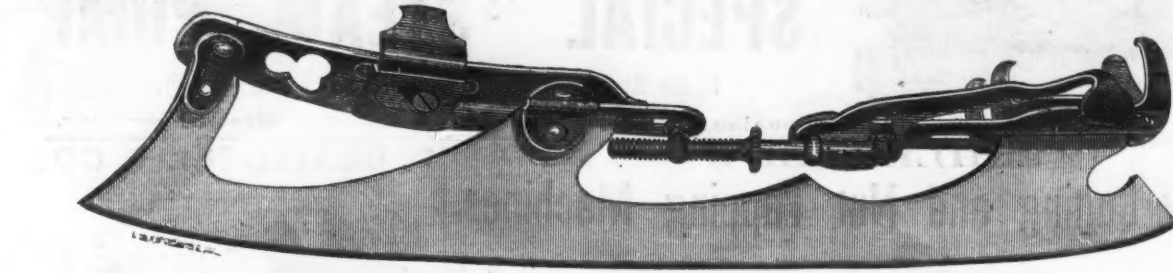
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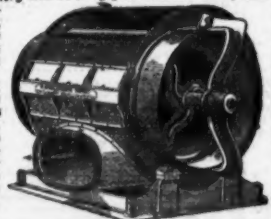
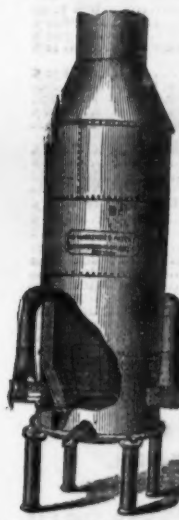
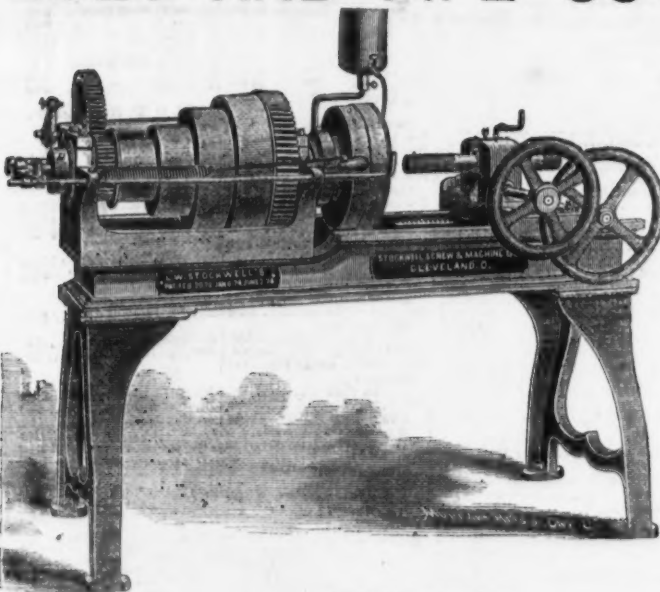
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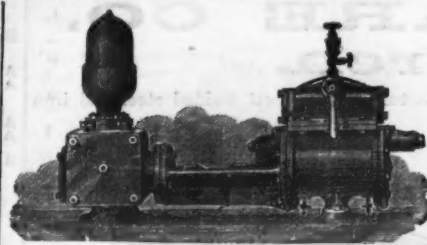
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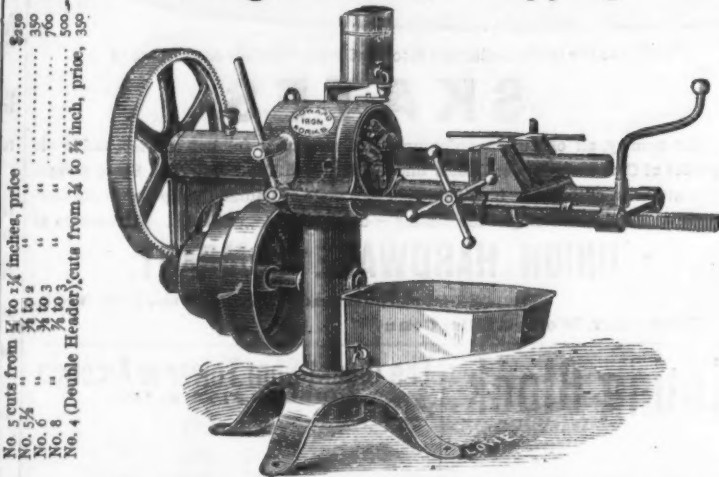
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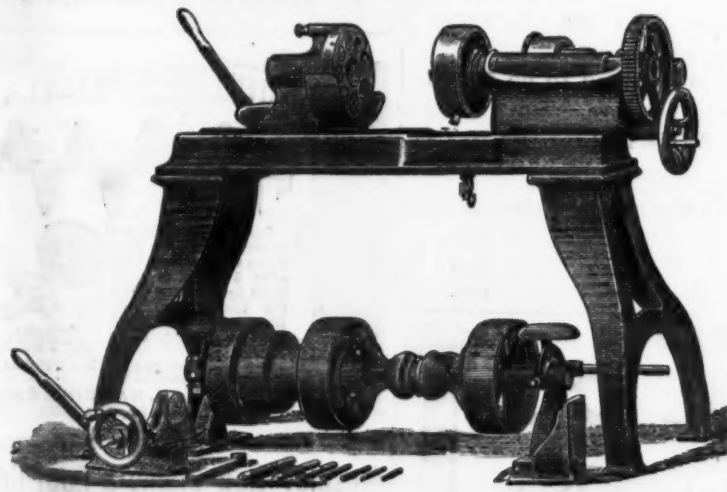
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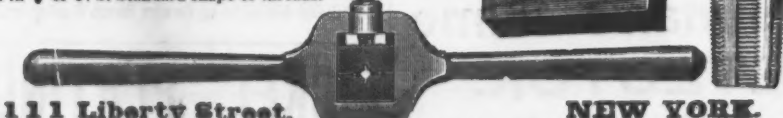
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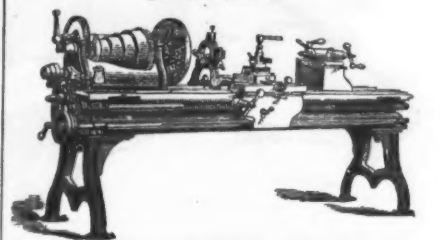
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